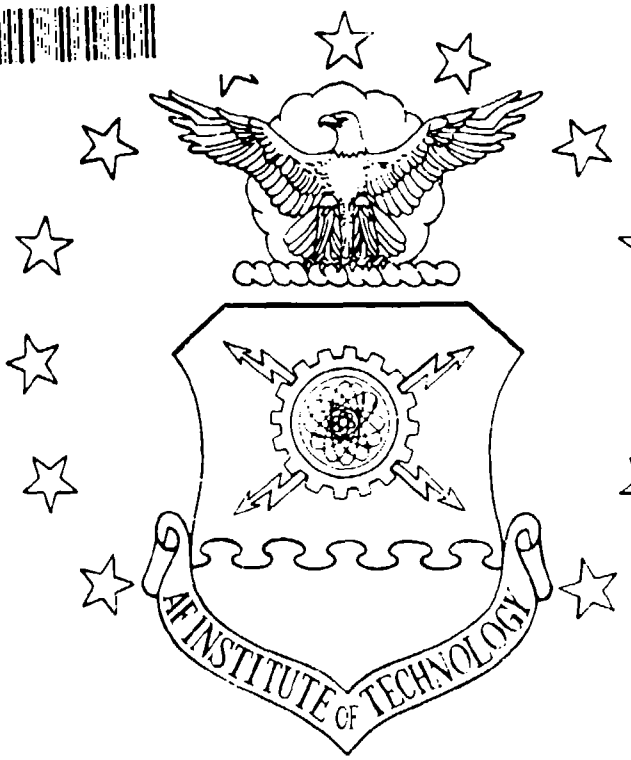

AN ANALYSIS OF THE BENEFITS OF OPERATIONAL EXPERIENCE ACQUIRED BY AIR FORCE SYSTEMS COMMAND (AFSC) OFFICERS THROUGH THE BROADENING EXPERIENCE TOUR (BEST) PROGRAM

THESIS

Andrew A. Abraham, Captain, USAF

AFIT GSM LSY 91S-1

DEPARTMENT OF THE AIR FORCE
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Wright-Patterson Air Force Base, Ohio

AFIT/GSM/LSY/91S-1

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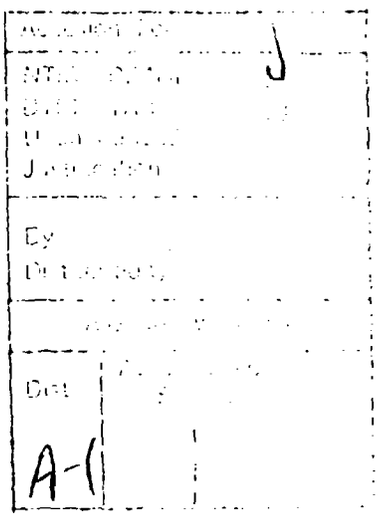

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THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Systems Management

Andrew A. Abraham, B.E.
Captain, USAF

September 1991

Preface

I would like to acknowledge the help provided by my advisor, Capt Kevin P. Grant. His patience and guidance was instrumental in th completion of this study effort. I would like to acknowledge the inspiration provided by my parents Victor and Cuqui, and my mother-in-law Helen. Above all, I would like to thank my beloved wife Helene for her love and support. This thesis is dedicated to the memory of an engineer, lawyer and good friend Luis R. Maldonado who passed away on August 26, 1991.

Andrew A. Abraham

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Abstract

This research effort was conducted to study the effects that operational experience acquired through the Broadening Experience Tour (BEST) program has on the ability of scientific and development engineering (S&DE) officers to develop useful operator-oriented systems. A review of the related literature revealed that although the Air Force encourages S&DE officers to acquire operational experience, there is no empirical evidence of the reported benefits of this experience. A cross sectional study was undertaken to measure the difference in self reported competency between samples of S&DE officers with and without operational experience. A survey was designed to measure the ability of the S&DE officers to interpret operational requirements, to communicate with the using organizations, and to measure the credibility of their personal judgement. The results of the study revealed the operational experience acquired through the BEST program enhanced the ability of S&DE officers to communicate with the using organizations. Rated officers ranked themselves higher than BEST officers in their ability to interpret operational requirements. No difference was found in the level of credibility between officers with and without operational experience.

AN ANALYSIS OF THE BENEFITS OF OPERATIONAL EXPERIENCE ACQUIRED BY AIR FORCE SYSTEMS COMMAND (AFSC) OFFICERS THROUGH THE BROADENING EXPERIENCE TOUR (BEST) PROGRAM

I. Introduction

General Issue

During the last decade, stories of cost overruns, spare parts overpricing, and poor quality have prompted efforts to improve the services provided by the Department of Defense (DoD) acquisition community (1:21). Consistent with this objective the Air Force created the Acquisition Management Professional Development Program (AMPDP) for officers in the scientific and development engineering (S&DE) career fields. Air Force Systems Command Regulation 36-5, which outlines the requirements of the AMPDP, states that "operational experience gained in an Air Force major air command (other than AFSC or AFLC) or in a joint command is highly desirable (2:2)." Air Force Regulation (AFR) 36-23, Officer Professional Development, states that a mixture of technical and operational experience "will enhance the ability of the S&DE force to interpret operational requirements, develop useful operator-oriented systems, communicate effectively with using organizations, and (in the final analysis) establish credibility for their judgment (3:70)."

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This research project examined the impact of operational experience acquired by Air Force Systems Command officers through the Broadening Experience Tour (BEST) program on their ability to develop useful operator-oriented systems. It was assumed in this study that the ability to interpret operational requirements, the ability to communicate with the using organization, and credible judgement were prerequisites to develop useful operator-oriented systems. The S&DE utilization fields associated with R&D are Air Force Specialty Code (AFSC) 26XX - Scientific utilization field, AFSC 27XX - Acquisition Program Management utilization field, and AFSC 28XX - Development Engineering utilization field.

Background

During the mid 70's most of the Air Force officers with operational experience were assigned to acquisition duties through the rated supplement (4:23). The rated supplement is a system that "takes pilots and navigators out of airplanes (especially if there are far too many rated officers for the available aircraft) and tries to utilize them in other jobs in the service (5:21)." These officers were rated senior captains, majors, and lieutenant colonels who were available after the Air Force began the withdrawal from Vietnam. In 1973 officers in the rated supplement accounted for 22 percent of all acquisition officers in Air Force Systems Command (4:23).

During the late 70's the number of officers in the Air Force decreased due to the "erosion of benefits" and the belief "that their fellow citizens held them in low esteem (4:23)." By 1987 the demographic composition of acquisition officers had changed dramatically. In that year 30 percent of the acquisition officers in Air Force Systems Command had operational experience, out of which only six percent were officers in the rated supplements. In addition, the acquisition force was younger as well; 45 percent of the acquisition officers were lieutenants and 32 percent were captains (4:23).

In 1984 the Air Force Broadening Experience Tour (BEST) program was created to increase the number of officers with non-rated operational experience, and to fill critically undermanned operational career fields (6). The BEST program places acquisition officers into operational assignments and brings them back to Systems Command at the end of the tour (4:26). Currently, operational experience is infused through the rated supplement; crossflow assignments from operational utilization fields into S&DE utilization fields; and the BEST program. The rated supplement currently provides the majority of officers with operational experience (7).

Problem Statement

The BEST program was created to increase the number of officers with operational experience assigned to S&DE

utilization fields in Air Force Systems Command. A mixture of technical and operational experience is believed to enhance the ability of officers in S&DE utilization fields to develop useful operator-oriented systems. Is the ability to develop useful operator-oriented systems different between officers who participated in the BEST Program and officers without operational experience? If officers who participated in the BEST Program are more able in general to develop useful operator-oriented systems than officers without operational experience, to what extent is their advantage due to the relevance of their operational experience to their current assignments?

Objective

The objective of the research was to determine if the operational experience acquired through the BEST program by officers in the 26XX, 27XX, and 28XX career fields enhances their ability to develop useful operator-oriented systems.

Investigative Questions

To determine the impact of operational experience acquired by AFSC officers through the BEST program on their ability to develop useful operator-oriented systems, the following questions were researched:

1. Does participation in the BEST Program enhance the ability of S&DE officers to interpret operational requirements?

2. Does participation in the BEST Program enhance the ability of S&DE officers to communicate with the using organizations? Using organization is defined as the recipient organization of the system.

3. Does participation in the BEST Program help S&DE officers establish credibility for their judgment?

4. To what extent is the ability to develop useful operator-oriented systems affected by relevant operational experience? Relevant operational experience is defined as experience with or related to the system being developed.

Scope and Limitations

This research focused on the utilization of officers in the 26XX, 27XX, and 28XX career fields only. Although it is possible other acquisition related utilization fields might benefit from the infusion of operational experience, the time allotted for the completion of this research made it impossible to include them all in the study. Since the BEST program is an Air Force Systems Command program, this research was further limited to officers in this command. In addition, this research was confined to the Aeronautical Systems Division (ASD) which has the highest concentration of BEST officers who have returned from operational assignments. The effects of operational experience on senior S&DE officers were not addressed in this study.

Assumptions

The key assumption in this study is that the ability to develop useful operator-oriented systems is dependent on the ability to interpret operational requirements, the ability to communicate with the using organization, and possession

of credible judgement. Air Force Regulation 36-23 lists the ability to develop useful operator-oriented systems at the same level as the other benefits.

Justification

Air Force Systems Command, like the other Air Force major commands, has to compete for people with the right qualifications at a time when budget reductions threaten a reduction in military force. Since officers with operational experience in acquisition related career fields represent a minority, the effects of operational experience should be studied in an effort to determine if the infusion of the operational point of view to the acquisition process is in fact beneficial and hence should be pursued as a corporate objective.

Research Approach

A literature review and a mail survey were used to answer the research questions. An extensive literature review of Air Force and DoD regulations, and program management journals was conducted to obtain the secondary data necessary to understand the requirements and purported benefits of operational experience. Interviews with HQ AFSC/DPROA-2 personnel, and other personnel who worked in that organization during the start of the BEST Program were conducted as required to provide additional information not contained in the published material. A survey was then used to obtain the primary data necessary to determine the

relevance of operational experience in the development of useful operator-oriented systems.

Summary

This chapter presented the objective of the study effort, background of the problem area, and the investigative questions that were pursued. The limitations of the study and assumptions were also discussed. Chapter II provides the result of the literature review conducted to gain insight into the problem area. The details of the methodology employed to answer the investigative questions are presented in chapter III. Chapter IV provides the results of the study. Finally, the conclusions and recommendations are provided in chapter V.

II. Literature Review

Introduction

This literature review describes the purported benefits of operational experience in the scientific and development engineering (S&DE) utilization fields in support of systems acquisition in the Air Force, and identifies the type of assignments that qualify as operational experience. The main sources of information include Air Force Regulations, government program management journals, academic journals, and telephone interviews as required.

Discussion of the Literature

Science & Development Engineering Utilization Fields.

Air Force specialty codes (AFSCs) are used to identify the different jobs in the Air Force as well as the required qualifications to fill these jobs. All AFSCs are listed in Air Force Regulation 36-1, Officer Air Force Specialty. AFR 36-1 also specifies knowledge, education, experience, and training requirements, as well as other job specific qualifications for each AFSC (8:3).

An examination of the purported benefits of operational experience to the officers in the S&DE fields cannot start without the knowledge of the tasks performed by these officers. Seventy-five percent of the officers in the S&DE utilization fields provide scientific, technical, and management expertise to the Air Force systems acquisition

community (3:70). The AFSCs associated with the three S&DE utilization fields are 26XX Scientific utilization field, 27XX Acquisition Program Management utilization field, and 28XX Development Engineering utilization field.

A general guide to the professional development of S&DE officers is provided in Air Force Regulation 36-23, as well as the following general descriptions of each of the S&DE utilization fields:

AFSC 26XX - Scientific

This field is composed of many different scientific disciplines grouped together because of commonality of function--to accomplish basic or applied research under controlled and defined conditions to produce results that will add to the pool of existing scientific knowledge. (3:69)

AFSC 27XX - Acquisition Program Manager

This field is composed of officers who work the diverse elements associated with a new system's entry into the operational environment. A key element of this process is the delegation by the Secretary of the Air Force (SAF) of its executive role of managing all the participating commands and industrial organizations to the system program manager who exercises management through a system program office. These elements include development, test, and evaluation, financial management, configuration management, procurement, production, logistics support,training, and site activation. Officers from the Scientific (26XX), Development Engineering (28XX), and other areas enter this field by lateral transfer at the captain, major, and early lieutenant colonel grades. (3:69)

AFSC 28XX - Development Engineering

This field includes the engineering specialties concerned with the designing, developing, installing, modifying, testing, and analyzing of materials, techniques, methods, systems, or processes. A significant portion of the activities accomplished in this field may be described as test and evaluation and are primarily concentrated in AFOTEC and in AFSC's test centers, test ranges, and laboratories. (3:69)

According to AFR 36-27 most of the officers in S&DE fields past the rank of major will eventually move into the Acquisition Management (27XX) career field.

Operational Experience. In 1985, General Lawrence Skantze, then Commander of Air Force Systems Command, appointed Major General Ronald W. Yates, F-16 program director, to head the Acquisition Management Career Development Task Force (CDTF). The task force composed of twenty senior acquisition managers "acknowledged external pressures to develop a better career development path for acquisition managers, and agreed that improvements in their career development were needed." The efforts of the task force resulted in the implementation of the Acquisition Management Professional Development Program (AMPDP) (1:21).

The policies, procedures and standards of the AMPDP are embodied in the Air Force Systems Command Regulation 36-5. The purpose of the AMPDP as outlined in Air Force Systems Command Reg 36-5 was:

> to maximize the professional development and mission capability of the AM officer force by setting forth a definitive and viable career management plan that produces broad-based acquisition managers capable of assuming middle management and senior leadership roles. (2:2)

The AMPDP required a "broad experience in several acquisition disciplines and environments." Therefore, Air Force Systems Command Regulation 36-5 provided guidance concerning the type of assignments, academic education, and professional military education required to progress through

the AMPDP. A certification process was established that required the officer to progress through four levels of certification prior to being eligible to manage a major acquisition program. Furthermore, Air Force Systems Command Regulation 36-5 stated that "operational experience gained in an Air Force major air command (other than AFSC or AFLC) or in a joint command is highly desirable." The career areas that qualify as operational tour experience are listed in Air Force Systems Command Regulation 36-5, and presented in Table 1 (2:5).

Table 1

Operational Utilization Fields

Utilization Field	Air Force Specialty Codes
Pilot	10XX 11XX 12XX 13XX 14XX
Navigator	15XX 22XX
Air Traffic Control	16XX
Air Weapons Controller	17XX
Missile Operations	18XX
Space Operations	20XX
Weather	25XX
Missile Maintenance	31XX
Aircraft Maintenance & Munitions	40XX
Intelligence	80XX
Security Police	81XX

AFSCR 36-5

The AMPDP established by Air Force Systems Command applied to all the utilization fields that support the acquisition process. Therefore, it provided a channel for most officers in acquisition related utilization fields other than the 27XX (Acquisition Program Management) to develop the necessary skill to assume senior acquisition management positions.

In recognition of the different education and experience requirements of the different acquisition related utilization fields, the Air Force developed the Acquisition Professional Development Program (APDP) with different career paths for each utilization field. These new career paths were published in AFR 36-27, in 26 December 1990. The regulation is titled Officer Personnel: Acquisition Professional Development.

The requirements for certification under the APDP are similar to the AMPDP, but they are tailored to fulfill the requirements of each acquisition utilization field. However, AFR 36-27 establishes a certification process with three levels of progression instead of four.

The stated philosophy of the APDP is:

(1) Develop acquisition managers with a common basis of education, training and experience.

(2) Develop acquisition managers who have operational experience.

(3) Provide opportunities for professional broadening in related acquisition functional areas.

(4) Provide a challenging and achievable professional development track.

(5) Be understood by the personnel participating in the program and visible to the public. (9:7)

As stated in the second point of the APDP philosophy, operational experience is an important aspect of the development process. Operational experience is encouraged in seven of the eight career tracks outlined in AFR 36-27. The APDP also recognizes the fact that rated officers enter the acquisition career fields after an average of ten years of flying due to time constraints imposed by the Aviation Career Improvement Act (ACIA) of 1989. Therefore, the APDP provides a separate career track for rated officers (9:8).

The desirability for operational experience outlined by the AMPDP and later by the APDP was validated by two research studies. On September 1987, Cap Kevin W. Lopez, USAF, completed an AFIT thesis titled "Impact of AFSC Regulation 36-5 on the 27XX Career Field." In his study, Capt Lopez conducted an opinion survey of both junior and senior officers in the 27XX career field "to determine if the provisions of AFSC Regulation 36-5 are directly related to the career development of 27XX officers (10:2)."

Although the effects of operational experience on job performance were not studied by Cap Lopez, his study provided insight into the importance of operational experience to career progression as perceived by acquisition

officers. The recipients of the survey developed by Capt Lopez were randomly selected from all the officers with duty AFSCs in the 27XX career field stationed in the continental United States. The number of officers with operational experience who returned the survey was not reported.

One of the investigative questions addressed the applicability of operational experience to career development. The results of the survey supported the contribution of operational experience; approximately 63 percent of the junior officers, and 75 percent of the senior officers responded that operational experience is critical to career development (10:49). When asked about the minimum number of years of operational experience necessary for effective career development, 57 percent of the junior officers and 46 percent of the senior officers responded three years or less. In contrast, 21 percent of the junior officers and 40 percent of the senior officers responded that three to six years was appropriate. Despite the strong support for operational experience, 19 percent of the junior officers and 10 percent of the senior officers responded that it was unnecessary for career development (10:51).

The same survey used by Cap Lopez was subsequently used by Capt Reed J. McConnell in an AFIT thesis research effort completed in Sep 1988. Between the time that Cap Lopez released the survey and the time that Cap McConnell started his study, Air Force Systems Command conducted a series of informative briefings to educate acquisition officers on the

AMPDP. Cap McConnell conducted his research to determine if there were any general differences in responses after the education effort by Air Force Systems Command was completed. The results related to operational experience revealed no changes from the first survey (11:31).

The examination of Air Force Regulation 36-27 and Air Force Systems Command Regulation 36-5 only revealed the desirability of operational experience in S&DE utilization fields; there is no mention of specific benefits of operational experience in these regulations. The only regulation which mentions specific benefits of operational experience in these fields is AFR 36-23.

Specifically, operational experience is believed to provide the following benefits to officers in S&DE utilization fields; these are the enhanced ability to interpret operational requirements, enhanced communication with the users, enhanced credibility for personal judgement, and the enhanced ability to develop useful operator-oriented systems (3:70).

The need for operational experience as a part of the career development of acquisition officers is supported by high ranking Air Force officers. In relation to the AMPDP, General Bernard P. Randolph, former Commander of Air Force Systems Command stated:

> since there is no substitute for operational experience, we look for flying and non-flying operations too-missiles, space, and munitions or aircraft maintenance. Actually, we have built a professional development plan that accommodates

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> acquisition officers, test pilots and navigators, and operational pilots and NAVS. (12:6)

Colonel Michael Butchko stated the following when he was the program director of the F-15 fighter aircraft at Wright-Patterson Air Force Base in Ohio:

> I'm familiar with aviation, which I think is vital to someone who is in an aircraft acquisition program. If you don't speak the language, you don't have the credibility, and you don't know how to ask the right questions. (13:22)

The article "A Special Breed of Cat: The Fighter Pilot in Systems Acquisition Management," by Major Lee Lilly describes the successful application of operational experience. Major Lilly illustrates how a pilot discovered that a warning device developed for an aircraft was so sensitive that it detected threats too far away to present immediate danger to the pilot. Since the warning device could not display the distance to the threat, a close threat was treated the same way as a distant threat. For all practical purposes warning of a distant threat was equivalent to a false alarm (14:84).

Despite the support for operational experience as an element of career development for acquisition officers, there are officers in the Air Force who believe that operational experience is not necessarily essential. In the article "Buying in a Fishbowl: Two Acquisition Officers Comment," Lt Col Don Ruths, a rated officer explained:

> There are all sorts of ways to gain insight into the operational side of the house without actually being there... What's important is to develop close relationships with your prospective customers. (15:34)

In 1974, J. Ronald Fox a former Assistant Secretary of the Army reported an alternative view of operational experience; a view held by defense contractors. In his book Arming America, Fox presents the comments of several presidents and vice presidents of companies with major defense and space contracts. When asked for an opinion on Government personnel managing his programs one executive expressed:

> The military man who has operational experience need not be the project manager. Indeed, he should not be the project manager because it is almost impossible for him to have had sufficient training and experience in managing the acquisition process. Rather, the military men with operational experience should act in the capacity of consultants to the project manager. (16:189)

A second industry executive expressed a similar opinion:

> The Government doesn't need technical specialists or operational personnel as project managers. They need business managers as project managers and technical and operational people as consultants to the project manager. (16:189)

The critical comments provided by the defense industry executives were attributed by Fox to two problems that faced officers in the acquisition community; the fast rotation of military personnel to new assignments; and the lack of a definite career progression program for acquisition personnel (16:183,201). Concerning the problem of military personnel turnover one industry executive commented:

> The change of military personnel every two years leads to lack of responsibility on the part of both government and industry. (16:183)

A second industry executive expressed his opinion on the adequacy of the preparation of operational personnel in acquisition:

> Why does the program manager or top guy have to be a pilot? Industry doesn't run their projects with pilots. If we did, we'd be out of business in no time. (16:201)

The lack of career programs for acquisition officers affected not only the Air Force, but the other services as well. One industry executive commented on the subject:

> There should be career progression ladders for procurement officers and program managers, separate from the career progression ladders for operational personnel. We see no advantage to the country in taking a good boat commander and making him a program manager. (16:202)

In 1974 when Mr Fox's book was published, the Air Force lacked a definite career progression program such as the AMPDP and the APDP.

Kerzner provides a view similar to that of the industry executives interviewed by Mr Fox. On the importance of business skills to managers, Kerzner explains:

> The program manager rarely has all the technical, administrative, and marketing expertise needed to direct single-handedly. Nor is it necessary or desirable. It is essential, however, for the program manager to understand the technology, the markets, and the environment of the business to participate effectively in the search for integrated solutions and technological innovations. (16:170)

Regarding innovation, Eric Von Hippel argues that user experience may actually be undesirable. In the article "New Product Ideas From 'Lead Users'," professor Hippel states:

> users selected to provide input data to consumer and industrial market analyses have an important

> limitation: Their insights into new product needs and potential solutions are constrained by their own experience. Users steeped in the present are thus unlikely to generate novel product concepts that conflict with the familiar.
>
> The notion that familiarity with the existing product attributes and uses interferes with an individual's ability to conceive of novel attributes and uses is strongly supported by research into problem-solving. (18:60)

In summary, support for the need of Air Force acquisition officers with operational experience varies. Operational experience is officially encouraged in the Air Force. However, many executives in industry believe that acquisition officers should focus their career development to build business skills.

Broadening Experience Tour (BEST) Program. The BEST program was created by Air Force Systems Command in 1984 with a twofold purpose; to provide officers in S&DE career fields the opportunity to obtain operational experience; and to provide manning to critically undermanned operational career fields. The key elements of this program are that it is a voluntary program and that officers are guaranteed they will return to Air Force Systems Command at the end of the operational tour.

Once a year Air Force Systems Command announces the date of the BEST selection board, the operational utilization fields that are critically undermanned, and the eligibility criteria. The eligibility criteria include at least three years time on station, no more than six years of commissioned time, availability for reassignment, volunteer

status, and a good performance record. The operational utilization fields available for fiscal year 1992 include 17XX (Air Weapons Controller), 18XX (Missile Operations), 20XX (Space Operations), 31XX (Missile Maintenance), 40XX (Aircraft Maintenance), and 80XX (Intelligence) (6).

When the program started in 1984, less than 10 officers volunteered. The low response was attributed to the lack of knowledge of the new program. In 1985, approximately 25 engineers volunteered as a result of the Engineering Crossflow Program. This program was designed to reduce the overmanned 28XX career field, and help the Air Force Manpower and Personnel Center fill other undermanned fields. As a result of the Engineering Crossflow Program, 59 officers in the 27XX field with no technical education were permanently "crossflowed" to other career fields; and 75 engineers were reassigned between the BEST program and the 27XX field. Since 1985 an average of 25 officers have been reassigned every year through the BEST program (7).

Conclusions

A review of the literature describing the benefits and applicability of operational experience in the acquisition process revealed a clear institutional support for the need of this type of experience. The benefits and desirability of operational experience are outlined in Air Force regulations and supported by the comments of Air Force officials and opinion surveys.

Despite the official Air Force support, a different reaction was found from executives of DoD and space related industries. Industrial executives largely disapproved of the placing of operational personnel in acquisition related jobs. These executives favored the appointment of officers specialized in business practices. However, it was discovered in the literature that the reaction of these executives was published several years prior to the implementation of the Acquisition Management Professional Development Program in the late 80s, and the Acquisition Professional Development Program in 1990.

Although the literature available provided important insight into the benefits and desirability of operational experience, no empirical evidence was found that would confirm that operational experience enhances the ability of S&DE officers to develop useful operator-oriented systems. Therefore, primary data designed to study the effects of operational experience had to be collected. The details of the methodology used are presented in chapter III.

III. Methodology

Overview

This chapter describes the methodology used to collect and analyze the primary data used in this study. Specifically, this chapter discusses the methodology used to examine the effects that operational experience may provide to S&DE officers to develop useful operator-oriented systems.

Research Method

A cross-sectional study of the population of interest was conducted to obtain the primary data needed to study the effects of operational experience.

A mail survey was used to collect this data. The mail survey was chosen for its versatility and economy over a telephone survey.

Sample/Population of Interest

The population of interest for this research was comprised of all Air Force Systems Command officers with duty AFSCs 26XX (Scientific career field), 27XX (Acquisition Program Management career field), and, 28XX (Development engineering field). To answer the investigative questions, a minimum of two samples from the population were required; officers who attended the BEST program to obtain operational experience; and officers in the S&DE utilization fields with

no operational experience. However, samples of rated officers assigned to S&DE duties and non-rated officers who had operational experience prior to entering one of the S&DE utilization fields were also drawn to study possible differences between the various groups of officers with operational experience. Therefore, the sampling strategy used was a stratified sampling of officers with operational experience and those without it.

Emory states that "the ideal stratification would be based on the principal variable under study (19:307)." The principal variable under study was the possession of operational experience. The reasons for using stratified samples when the population can be segregated into subgroups are "(1) to increase a sample's statistical efficiency; (2) provide adequate data for analyzing the various subpopulations; and (3) enable different research methods and procedures to be used in different strata (19:307)."

In order to further define the samples and reduce possible variances that may have affected the results, this study considered only officers with active duty commissioned service dates between 1 September 1979 and 31 December 1984. These dates are consistent with the dates of active duty commissioned time of officers who have returned to Air Force Systems Command from BEST assignments.

Although the grade spread of officers in S&DE utilization fields is from second lieutenant to lieutenant colonel, the samples included only captains and majors. The

limits on active duty commissioned time resulted in samples in which the vast majority of the officers were captains. In addition, prior enlisted experience in operational fields was not considered since prior enlisted assignment information is not available to personnel resource managers at the time assignments are made.

In addition to the four comparison groups, the supervisors of the officers selected were also surveyed. Their responses were used to provide another reference for comparison.

Sample Size

To determine the size of the samples required, a data search was conducted with the Air Force ATLAS personnel computer on 25 April 1991. After the search was completed, the determination was made to limit sampling to the Aeronautical Systems Division (ASD) of Air Force Systems Command at Wright-Patterson Air Force Base, and to conduct a census of the three samples of officers with operational experience.

The sample was limited to ASD for two reasons: the number of officers that had participated in the BEST program; and the ability to obtain the name and addresses of supervisors from the 2750th ABW Consolidated Base Personnel Office and the ASD personnel office. During the time that this study was conducted, there were 59 officers who had

participated in the BEST program and returned to Air Force Systems Command; 11 of the 59 officers were assigned to ASD.

The census of the remaining officers with operational experience included 16 rated officers, and 14 non-rated officers who were "crossflowed" from operational assignments to S&DE assignments. The sample of officers without operational experience consisted of 51 officers who were selected randomly from the available population. The computer search of officers without operational experience considered only officers without prior enlisted experience. This last step was taken to assure that the officers indeed had no operational experience.

The computer search for the information on the supervisors revealed that some supervisors were responsible for more than one of the surveyed officers. In the cases where supervisors were responsible for more than one officer surveyed, these supervisors were asked to answer the survey for only one of the officers. This action was taken to avoid the overburden on the supervisor, and to prevent a high rate of non-responses.

Instrument

General. The instrument selected for data collection was a mail survey. A mail survey is less costly than a telephone interview, and can be answered by the respondent at his or her own convenience. In addition, it allows the respondent to remain anonymous. Anonymity is important,

because sensitive performance information was requested. Despite the advantages of the mail survey, non-response remained an important disadvantage (19:172). The surveys used are provided in Appendix A and Appendix B.

In an attempt to elicit a high response rate, the survey was kept as short as possible. Additionally, no names or social security numbers were requested to preserve the anonymity of the respondents. Further, to avoid possible biases that could result from possession or non-possession of operational experience, the real objective of the study was not revealed to the officers surveyed. "Placebo" questions were also introduced to help disguise the real objective of the survey.

Questionnaire Structure. The survey consisted of two parts; the first part collected necessary demographic information; and the second part consisted of measurement questions.

The survey requested the following demographic information:

1. Respondent's rank
2. Respondent's current duty AFSC
3. Respondent's acquisition experience, in number of years
4. Respondent's aeronautical rating
5. Respondent's operational AFSC other than rated AFSC
6. Respondent's operational experience, in number of years

7. Organization where the respondent was currently assigned

8. Respondent's primary undergraduate education

9. Respondent's primary graduate education

The second part of the survey consisted of two measuring schemes which were designed to answer the investigative questions. Five questions were created for each of the first three investigative questions. The questions used were not designed to measure all aspects of every purported benefit (enhanced ability to interpret operational requirements, enhanced communication with the using organization, and enhanced credibility). Instead these questions were designed to measure in broad terms the impact of operational experience on each purported benefit. The measurement questions were designed to be applicable to officers in three S&DE career fields. Seven "placebo" questions were also introduced. Although the purported benefits of operational experience are supposed to apply to systems in general, the questions in the survey were presented in relation to weapon systems. This decision was made, because ASD primarily acquires aeronautical "weapon" systems.

The second measurement scheme required respondents to rank six skills and six knowledge areas. The purpose of these questions was to determine the perceived importance of operational experience to officers who participated in the BEST program and officers without operational experience.

Officers with operational experience were also asked to report how relevant they thought their operational experience was to their current jobs. The intent of this question was to answer investigative question number four. This question was designed to determine if the benefits from operational experience are dependent on the relevancy of specific experience.

The answers to the surveys were collected on machine scoreable sheets. All the answer sheets were coded to allow identification of the respondent's sample group.

The surveys were mailed through local distribution at Wright-Patterson Air Force Base on July 1 1991. A suspense date of July 15 1991 was given to return the completed surveys. Once the responses were collected, the machine scoreable sheets were optically scanned.

Instrument Validity, Reliability, and Practicality

Emory states that the "characteristics of sound measurement" are high validity, reliability and practicality (19:94).

> Validity refers to the extent to which a test measures what we actually wish to measure. Reliability has to do with the accuracy and precision of a measurement procedure... practicality is concerned with a wide range of factors of economy, convenience, and interpretability. (19:94)

Validity can be categorized as internal and external. Internal validity is defined by Emory as "the ability of a research instrument to measure what is purported to measure (19:94)." Fowler describes three steps to improve internal validity; make the questions as reliable as possible;

include enough categories of responses so that the respondee can provide the best answer possible; and include various questions with different formats that measure the same factor (20:96). To increase the internal validity, five questions were provided for each of the three purported benefits of operational experience presented in chapter I. In addition, the survey was pretested and the questions were found to be clearly written and to the point. However, limiting the number of questions in the survey presented a trade-off between increasing validity and increasing the possible number of expected responses.

External validity refers to the ability of the instrument to measure the same information across different groups of persons, settings, and times (19:94). Although the survey instrument was provided only to samples of officers with six to 11 years of active duty commissioned service, the survey questions were written with the complete population in mind. However, external validity was not assessed.

Reliability refers to the degree that the survey provides consistent results. According to Emory reliability can be improved if external variations are minimized (19:100). Reliability is thus increased by matching the characteristics of the sample groups as much as possible. To lower variability, the number of years of commissioned service was controlled.

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The reliability of the survey was measured after collection and analysis of the primary data. A Cronbach alpha was selected to measure reliability. Cronbach's alpha is the mean of all possible split-half correlation coefficients of the responses. A different alpha was computed for each investigative question (21:196).

A problem was encountered when the Cronbach alphas were computed. The measurement scale, which is discussed in the next section, was not structured to provide equal intervals. The first response option was designed for officers who ranked themselves in the lowest 40 percent to their peers who held similar jobs. The rest of the response options in the measurement scale increased at intervals of ten percent. For this reason the Cronbach alphas were computed twice (see Appendix C); once with the measuring scale intact; and the second time with the first item deleted. The results of both computations are presented in Table 2.

Table 2

Reliability Measures of Survey Questions, by Investigative Question (Cronbach Alphas)

	Invest. Question 1	Invest. Question 2	Invest. Question 3
Original Scale	.8380	.8396	.9285
Modified Scale	.7269	.8998	.9237

These results suggest the questions were reliable for use in this study.

Although the use of a mail survey required additional effort to obtain authorization from the Air Force Manpower and Personnel Center, it was a more practical instrument than telephone interviews. The survey was less expensive, and required less time to administer. Additionally, the survey allowed respondents to answer when it was most convenient to them.

Finally, the survey generates standard responses so it is easier for a person not involved in the construction of a survey to interpret the results (20:101).

Selection of Measurement Scale. The selection of a suitable measuring scale is critical. The measurement scale determines the level of the data collected. The level of data in turn determines the type of statistical tests which are appropriate to interpret the results of the study. In addition, selection of a measurement scale that provides a wide choice of responses can increase the validity of the instrument and reduce ambiguities.

The measurement scale used in this survey was an ordinal scale which allowed respondents to select alternative percentile ratings. Based on the results of a pre-survey, the number of response options was reduced from nine to seven. Non-parametric statistical tests were selected since this response scale was ordinal and the characteristics of the population distribution were unknown (23:23).

Statistical Tests

The main objective of this study was to examine the effects of operational experience on the ability of S&DE officers to develop useful operator-oriented systems. This was accomplished by measuring the difference in self reported competency between samples of officers with and without operational experience. The statistical tests applied to the data collected in this study were selected for their ability to determine whether the responses collected with the survey were provided by samples of officers from the same population.

The data collected with the individual measurement question is of the ordinal type, and the median is the appropriate measure of central tendency (20:89). The median test, which "is a procedure for testing whether two independent groups differ in central tendencies," was selected (23:111). If a significant difference was not found, the implication was that the samples came from the same population. However, if a significant difference was found, then the implication was that samples were drawn from different populations. Tests between samples were made for each question (i.e. BEST officers versus officers with no operational experience, etc.). The results of all the tests are provided in Appendix D and the significant results discussed in chapter IV.

The Friedman two-way analysis of variance was used to test the ranking schemes. This test is used to evaluate i:

k number of samples are drawn from the same population (22:166). The Friedman statistic computed with this test was used to compute W, the Kendall's coefficient of concordance. The coefficient of concordance W is a measurement of agreement between the survey respondents. This test is typically used to assess the level of agreement among judges. The coefficient of concordance is linearly related to the Friedman statistic by $W = X/n(r-1)$, where n is the number of samples and r is the number of ranked items (22:229). In addition to the Friedman test, a multiple pairwise testing procedure introduced by Netter, Wasserman and Kutner was used. This procedure was used to test the comparative magnitude of the means of the ranked items. This last procedure is analogous to the "Bonferroni pairwise comparison" (23:950). The results of the Friedman test and the multiple pairwise comparisons are presented in Appendix E.

Finally Spearman Rank Correlation coefficients were computed for all questions to determine the strength of association between supervisor and subordinate responses (22:202).

The statistical tests and analyses were conducted using the statistical computer programs Statistix 3.1 running on a personal computer, and SAS 6.0 running on a mainframe computer.

Summary

This chapter provided all the information pertinent to the methodology applied in the collection and analysis of the primary data. The samples from the population of interest were defined as well as the data collection instrument. The appropriate statistical tests as well as the limitations and assumptions were also identified. The results of the data primary collection effort and analysis are presented in chapter IV.

IV. Findings and Analysis

Introduction

This chapter describes the results of the analysis conducted on the data collected with the survey. The description of the response to the survey is presented first followed by the demographic statistics collected. Finally, the specific findings and analysis for all survey questions are presented.

Survey Response

The survey response rates for all samples of survey recipients are listed in Table 3.

Table 3

Survey Response Rate by Sample

GROUP	Surveys Mailed	Surveys Received	Response Rate
BEST Officers	11	8	72.7%
Rated Officers	16	1	62.5%
Other-ops	14	7	50.0%
Non-ops Officers	51	21	41.2%
Supervisors BEST	11	5	45.5%
Supervisors Rated	15	7	46.7%
Supervisors Other-ops	14	7	50.0%
Supervisors Non-ops	38	16	42.1%
TOTAL	170	81	47.6%

The overall response rate was 47.6%. The response rate for the supervisors was lower than the rate for the officers studied.

Demographic Statistics

The first part of the survey collected information required to present vital characteristics of the various groups of officers studied. The first demographic data presented is the number of officers in each S&DE career field. This data is presented in Table 4.

Table 4

Composition of Samples by S&DE Utilization Fields

	Scientists	Acquisition Program Mgrs	Engineers
GROUP	26XX	27XX	28XX
BEST Officers		1	7
Rated Officers		8	2
Other-ops	1	5	1
Non-ops Officers	1	5	15
TOTAL	2	19	25
Percentage	4.4%	41.3%	54.3%

The majority (54.3%) of the officers surveyed had a duty AFSC of 28XX (Development Engineering). The preponderance of the remaining officers were (42.3%) Acquisition Program Managers, AFSC 27XX. There were only two scientists, AFSC 26XX, who responded to the study survey. Seven of the 8 BEST program participants were engineers. Only one participant in the BEST sample was an

acquisition program manager. The vast majority of officers in the sample without operational experience were also engineers. On the other hand, the majority of the rated officers as well as the non-rated officers who acquired their operational experience before assignment to S&DE positions held acquisition program management positions.

Another important demographic factor examined was the number of years of acquisition experience possessed by the officers surveyed. Acquisition experience was defined in the survey as experience gained from working in any of the S&DE career fields. The number of years of acquisition experience are summarized by samples in Table 5.

Table 5

Years of Acquisition Experience of Officers Surveyed

	2< Yrs	2-4 Yrs	4-6 Yrs	6-8 Yrs	8-10 Yrs	10> Yrs
BEST Officers		3	2	2	1	
Rated Officers	6	3	1			
Other-ops Officers	2	4		1		
Non-ops Officers	2	1	2	8	6	2

The sample of officers without operational experience possessed the most acquisition experience, followed by the officers in the BEST sample. The sample with the least acquisition experience was the sample of rated officers. The majority of the rated officers surveyed possessed less than two years of acquisition experience.

The demographic statistics collected also provide information regarding the operational specialties of the officers in the various samples. The sample of rated officers was composed of four pilots and six navigators. The numbers of officers possessing the various non-rated operational specialties are provided in Table 6.

Table 6

Composition of Samples by Non-rated Operational Utilization Fields

	Missile Ops.	Weather	Aircraft Maint.	Intel
	18XX	25XX	40XX	80XX
BEST Officers			8	
Rated Officers		1		
Other-ops	3		3	1

The key finding from Table 6 is that all of the officers in ASD who participated in the BEST program acquired operational experience as aircraft maintenance officers.

The number of years of operational experience was also collected. This information is presented in Table 7. The majority of the BEST officers surveyed possessed two to four years of operational experience, while the majority of the rated officers had six to ten years of operational experience. The majority of the officers who entered the S&DE field after non-rated operational assignments had four to six years of operational experience. Since rated officers have to undergo extensive training for a long

period of time, rated officers are not allowed to transfer to S&DE duties as early as officers with other non-rated operational experience.

Table 7

Years of Operational Experience of Officers Surveyed

	2< Yrs	2-4 Yrs	4-6 Yrs	6-8 Yrs	8-10 Yrs	10> Yrs
BEST Officers		5	2	1		
Rated Officers	1			2	5	2
Other-ops Officers		1	5	1		

In summary, the demographic statistics provided a detailed view of the various characteristics of the different samples. Seven out of eight of the BEST officers were engineers and all of them had experience as aircraft maintenance officers. The majority of the officers without operational experience were also engineers. In contrast, the majority of the rated officers who participated in this study were acquisition program officers.

Specific Findings and Analysis

This section presents the results of the analysis conducted in this study. The findings from each individual survey question are presented along with the relevant investigative question.

Investigative Question 1

Investigative question number one explores whether the operational experience acquired through the BEST program enhances the ability of S&DE officers to interpret operational requirements. Survey questions number 11, 14, 19, 22, and 26 were designed to answer investigative question number one. The results from each question are presented below:

Survey Question 11. When it comes to evaluating the logistics support required to maintain the weapon system(s)/ component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

The median responses from all samples for question 11 are presented in Figure 1.

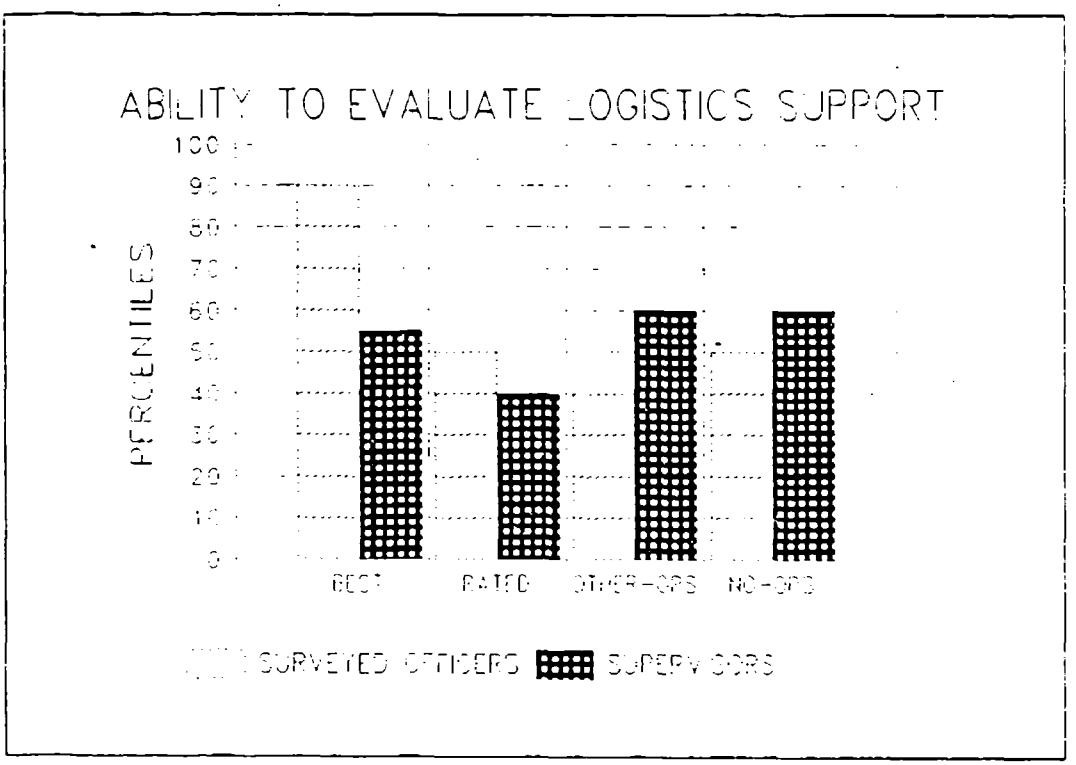

Figure 1. Median Responses for Survey Question 11

Question 11 was included to determine if operational experience enhances the ability of S&DE officers to evaluate logistics support. The self reported ability of officers from the BEST sample to evaluate logistics support was higher (at α=.05) than the self reported ability of officers from all other samples. There was no statistical difference based on supervisor ratings.

Survey Question 14. When it comes to reading and comprehending the operational deficiencies outlined in operational requirements documents such as the Statement of Need (SON), the Statement of Operational Requirements Document (SORD), the Operational Requirements Document (ORD), and the Mission Need Statement (MNS), I do better than ____ of my peers whose jobs are similar to mine.

The results for question 14 are presented in Figure 2.

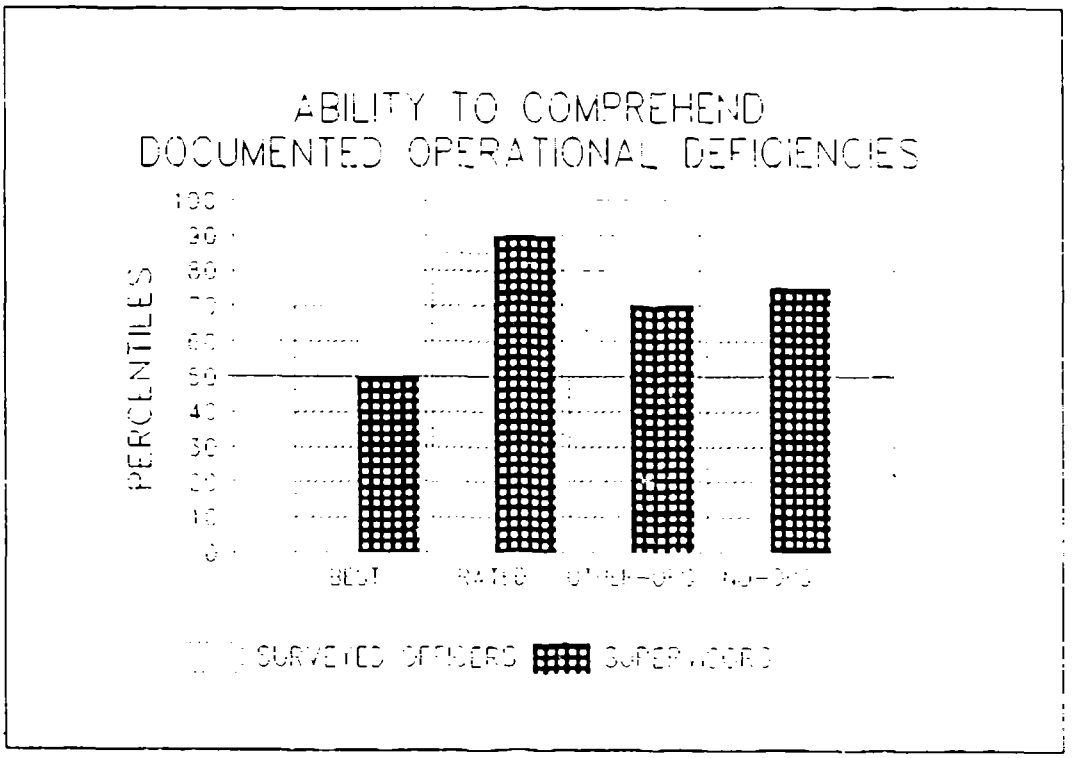

Figure 2. Median Responses for Survey Question 14

Question 14 was included to determine if operational experience enhances the ability of S&DE officers to understand operational requirements as they are officially documented. The self reported ability of rated officers to understand deficiencies outlined in operational requirements documents was higher (at α=.05) than that of officers with no operational experience. There was no statistical difference based on supervisor ratings.

Survey Question 19. When evaluating alternative technical solutions to the operational deficiencies which will be corrected by the weapon system(s)/component(s) that my organization develops/produces, I do better than____of my peers whose jobs are similar to mine.

The results for question 19 are presented in Figure 3.

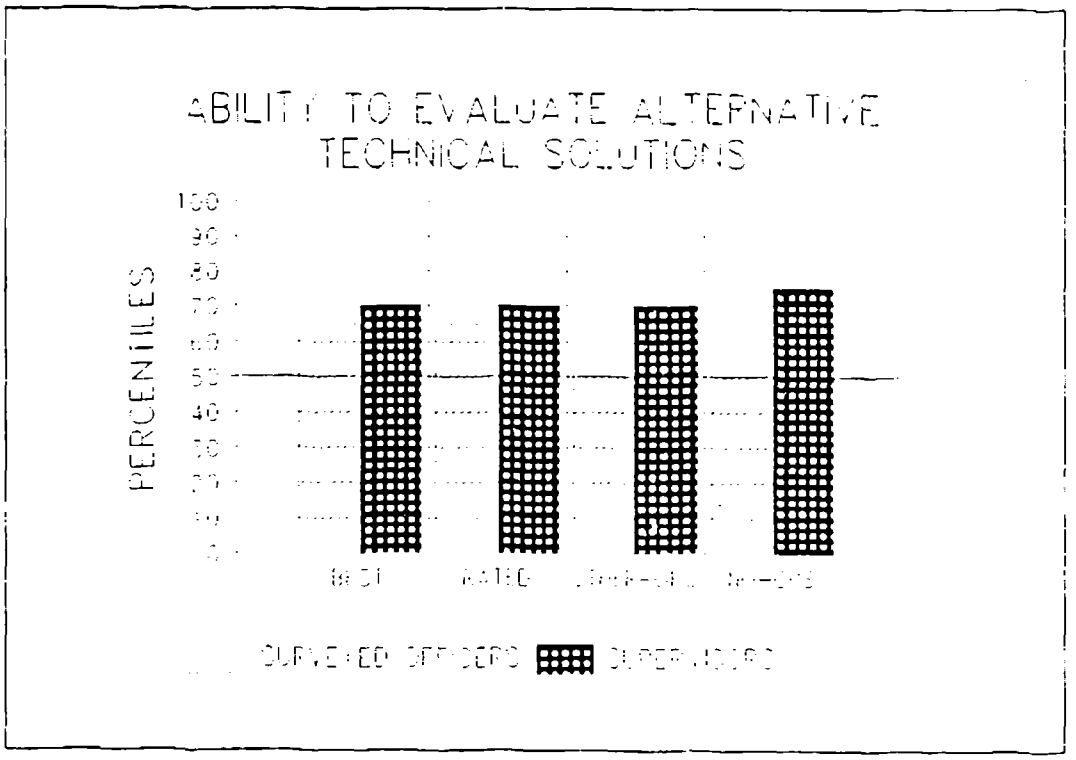

Figure 3. Median Responses for Survey Question 19

Question 19 was included to determine if operational experience enhances the ability of the S&DE officers to evaluate technical solutions to operational deficiencies. The self reported ability of officers from the BEST sample to evaluate technical solutions to operational deficiencies was higher (at α=.05) than that of officers with other non-rated operational experience. There was no statistical difference based on supervisor ratings.

Survey Question 22. When assessing the appropriateness of performance parameters in system level specifications and other technical documents, I do better than ____ of my peers whose jobs are similar to mine.

The results for question 22 are presented in Figure 4.

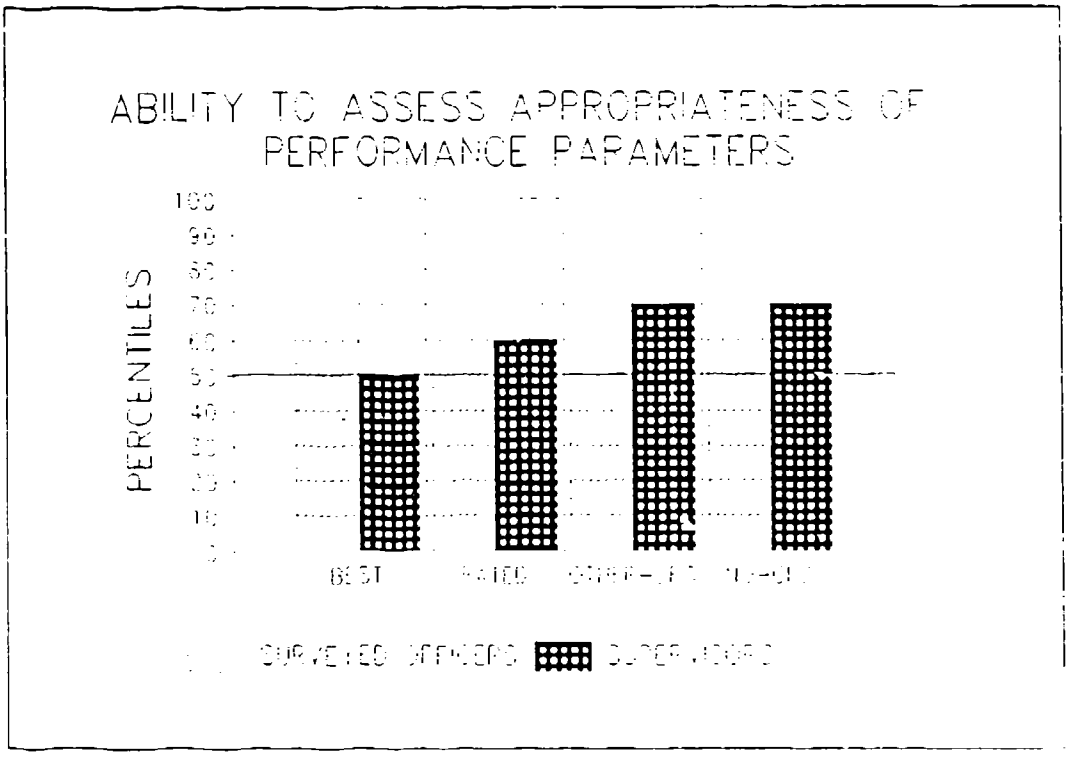

Figure 4. Median Responses for Survey Question 22

Question 22 was included to determine if operational experience enhances the ability of the S&DE officers to assess performance parameters of weapon systems. No significant statistical difference (at α=.05) in self reported ability to assess the appropriateness of performance parameters outlined in system level specifications and other technical documents was detected between any of the samples of officers surveyed. There was no statistical difference based on supervisor ratings.

Survey Question 26. When evaluating the test requirements needed to assess the military worthiness of the weapon system(s)/ component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

The results for question 26 are presented in Figure 5.

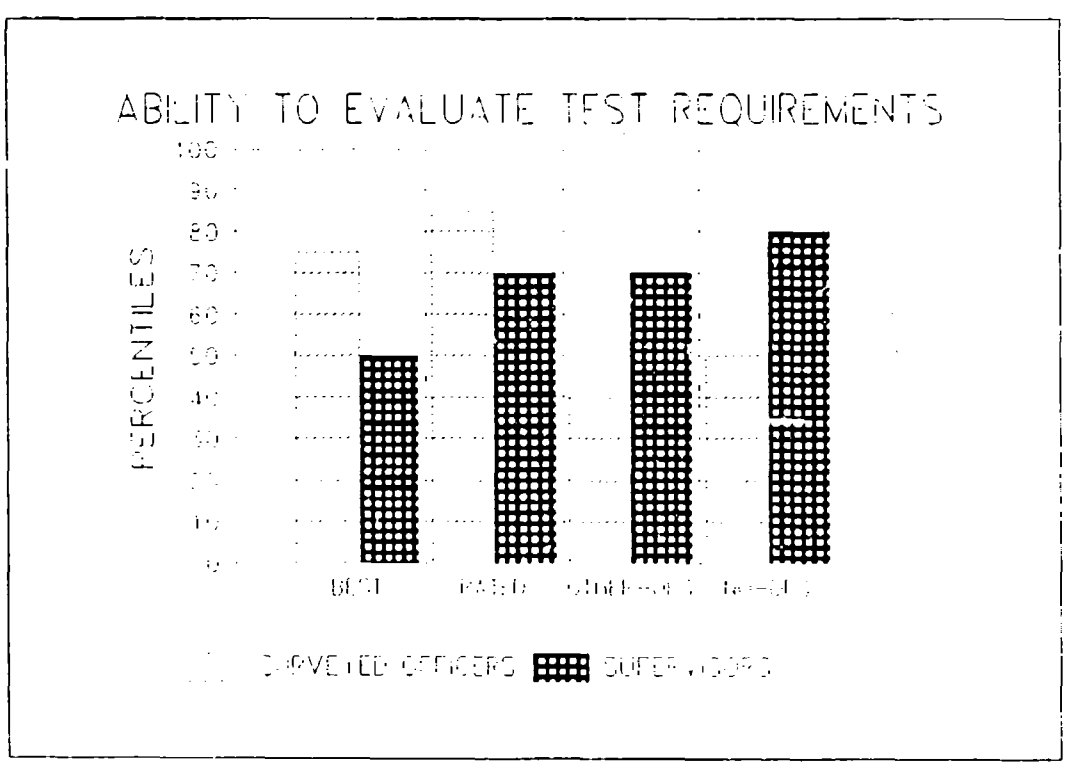

Figure 5. Median Responses for Survey Question 26

Question 26 was included to determine if operational experience enhances the ability of S&DE officers to evaluate test requirements.

The self reported ability of rated officers to evaluate test requirements needed to assess the military worthiness of weapons systems/components was higher (at α=.05) than that of officers with no operational experience as well as those with other non-rated operational experience. The self reported ability of officers from the BEST sample was higher (at α=.05) than that of officers with other non-rated operational experience. A difference (at α=.05) was detected in the rating of the supervisors of officers with no operational experience who ranked their subordinates higher than the supervisors of the officers in the BEST sample.

In summary, officers who participated in the BEST program do not report an enhanced ability to interpret operational requirements over those officers with no operational experience.

Investigative Question 2

Investigative question number two explores whether operational experience acquired through the BEST program enhances the ability of S&DE officers to communicate with using organizations. Survey questions 13, 17, 24, 27, and

31 were designed to answer investigative question number two. The results from each question are presented below:

Survey Question 13. When it comes to briefing the users of the weapon system(s)/component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

Question 13 was included to determine if operational experience enhances the ability of S&DE officers to communicate with using organizations through formal presentations. The median responses from all samples for question 13 are presented in Figure 6.

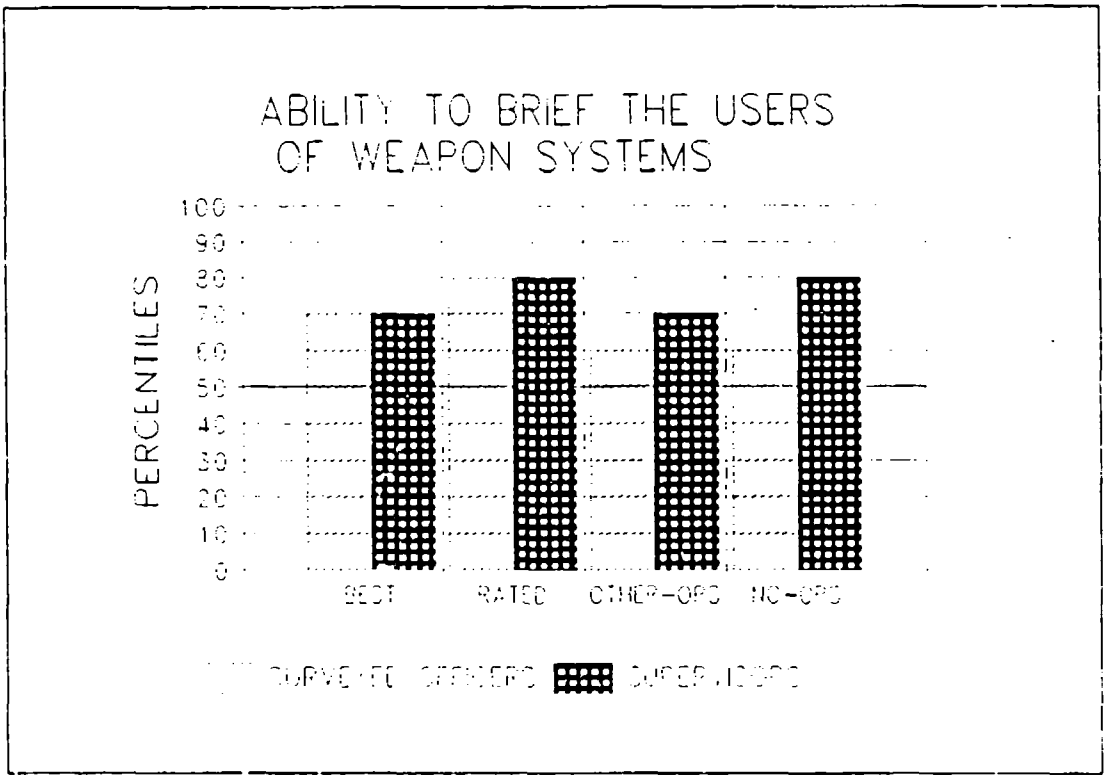

Figure 6. Median Responses for Survey Question 13

No significant statistical difference (at α=.05) was found between the self reported ability of officers surveyed

to brief the users of weapon systems. There was no statistical difference based on supervisor ratings.

Survey Question 17. When it comes to understanding the language used in operational requirements documents such as the Statement of Need (SON), the Statement of Operational Requirements Document (SORD), Operational Requirements Document (ORD), and the Mission Need Statement (MNS), I do better than ____ of my peers whose jobs are similar to mine.

Question 17 was included tc determine if operational experience enhances the ability of S&DE officers to understand the requirements of the operational users as officially documented. The median responses from all samples for question 17 are presented in Figure 7.

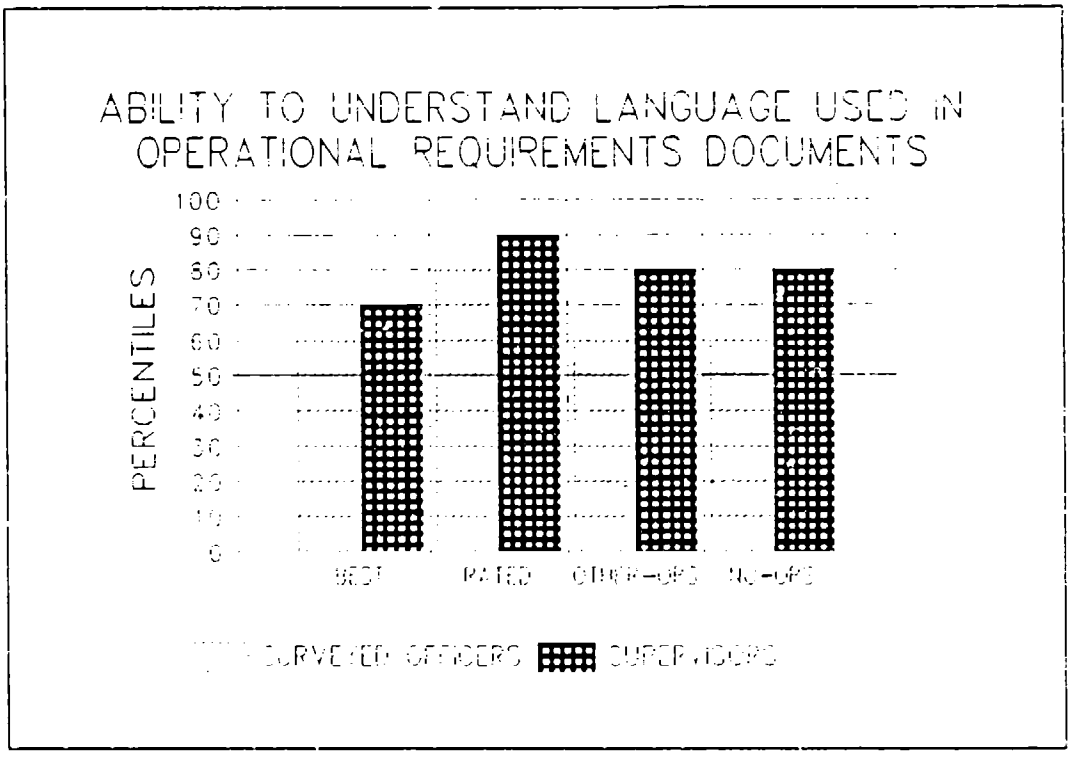

Figure 7. Median Responses for Survey Question 17

The self reported ability of rated officers to understand the language used in operational requirements

documents was higher (at α=.05) than that of officers with no operational experience. There was no statistical difference based on supervisor ratings.

Survey Question 24. When it comes to understanding the acronyms used by the users and maintainers of the weapon system(s)/ component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

Question 24 was included to determine if operational experience enhances the ability of S&DE officers to understand the acronyms used by users and maintainers of weapon systems. The median responses from all samples for question 24 are presented in Figure 8.

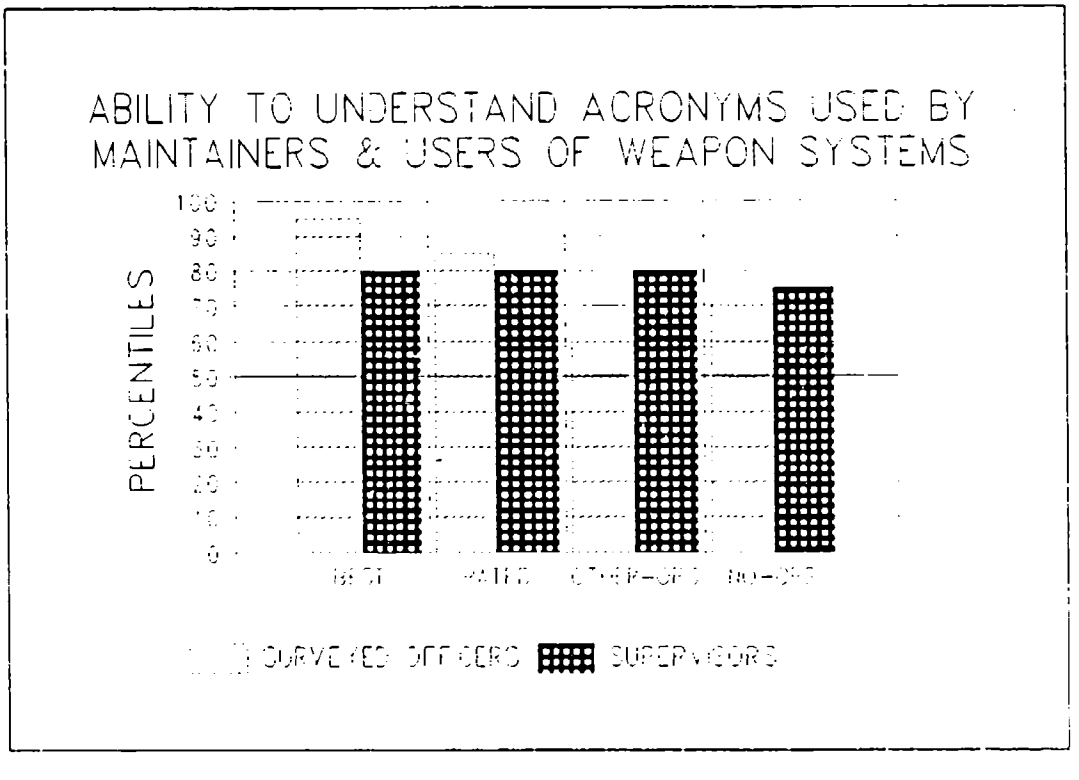

Figure 8. Median Responses for Survey Question 24

The self reported ability of officers from the BEST sample to understand the acronyms used by users and maintainers of weapon systems was higher (at α=.05) than that of officers with no operational experience and officers with other non-rated operational experience. There was no statistical difference based on supervisor ratings.

Survey Question 27. When it comes to determining the organization in the using command which can provide the various types of data required to do my job, I do better than ____ of my peers whose jobs are similar to mine.

The median responses from all samples for question 27 are presented in Figure 9.

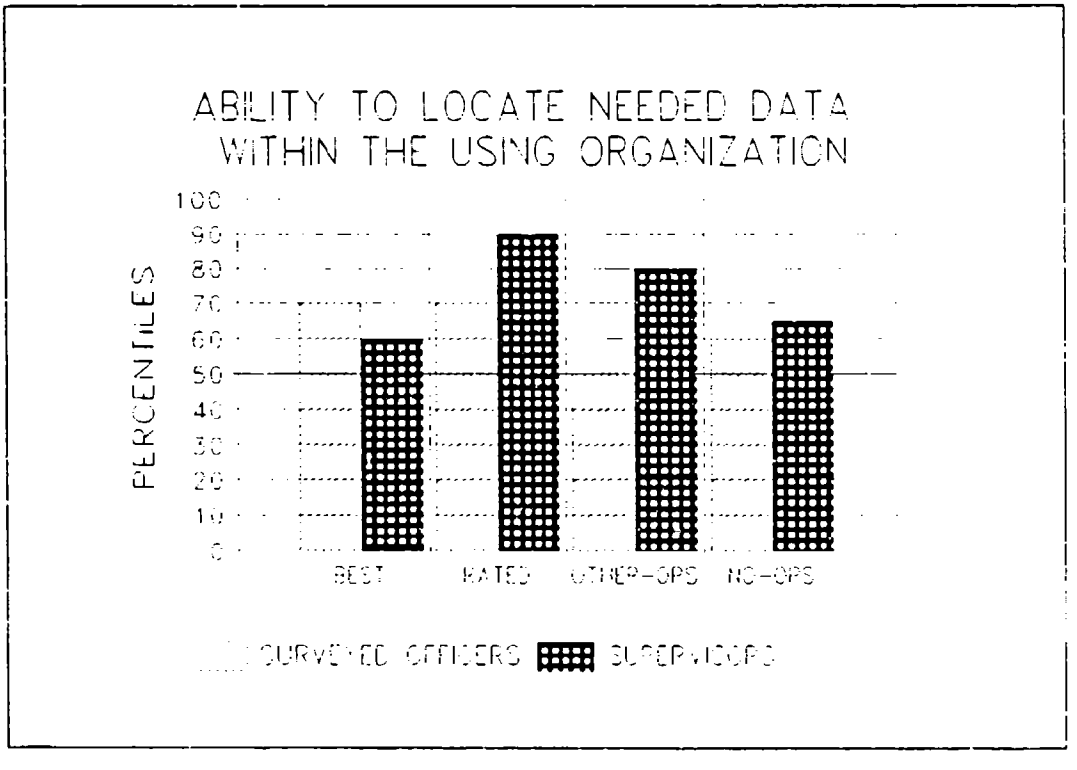

Figure 9. Median Responses for Survey Question 27

Question 27 was included to determine if operational experience enhances the ability of S&DE officers to

determine where to seek information within the using organization. The self reported ability of officers from the BEST sample to determine the organization in the using command which can provide the various types of data required to do their work was higher (at α=.05) than that of officers with no operational experience. There was no statistical difference based on supervisor ratings.

Survey Question 31. When determining the type of data required by maintenance personnel to support the weapon system(s)/ component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

The results for question 31 are presented in Figure 10.

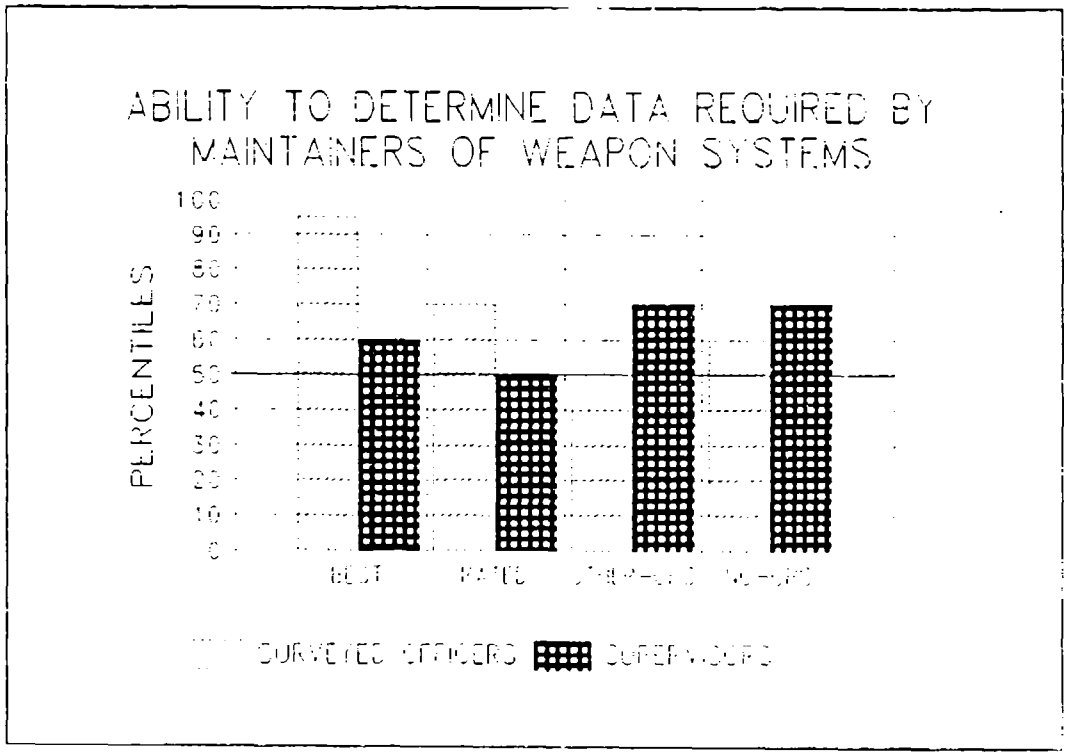

Figure 10. Median Responses for Survey Question 31

Question 31 was included to determine if operational experience enhances the ability of S&DE officers to determine the type of data required by maintenance personnel. Part of being able to communicate with the user is knowing the type of information needed by maintenance personnel.

The self reported ability of officers from the BEST sample to determine the type of data required by maintenance personnel to support weapon systems was higher (at α=.05) than the self reported ability of all other officers. There was no statistical difference based on supervisor ratings.

In summary, the self rating of officers who participated in the BEST program reflect a greater ability to communicate with the using organization than officers in other samples. This ability is most evident regarding familiarity with maintenance data requirements, acronyms, and sources of information.

Investigative Question 3

Investigative question number three explores whether the operational experience acquired through the BEST program helps S&DE officers establish credibility for their judgment. Survey questions 10, 12, 20, 30, and 32 were designed to answer investigative question number three. The questions measure their ability to influence development

production decisions, and decisions affecting capabilities of weapon systems. The results from each questions are presented below:

Survey Question 10. When it comes to providing advice on matters affecting the development/production of the weapon system(s)/component(s) in my organization, I am called upon more often than ____ of my peers whose jobs are similar to mine.

Question 10 was included to determine if operational experience increases the frequency that S&DE officers are called upon to provide advice on matters affecting the development/production of weapon systems. The median responses from all samples for question 10 are presented in Figure 11.

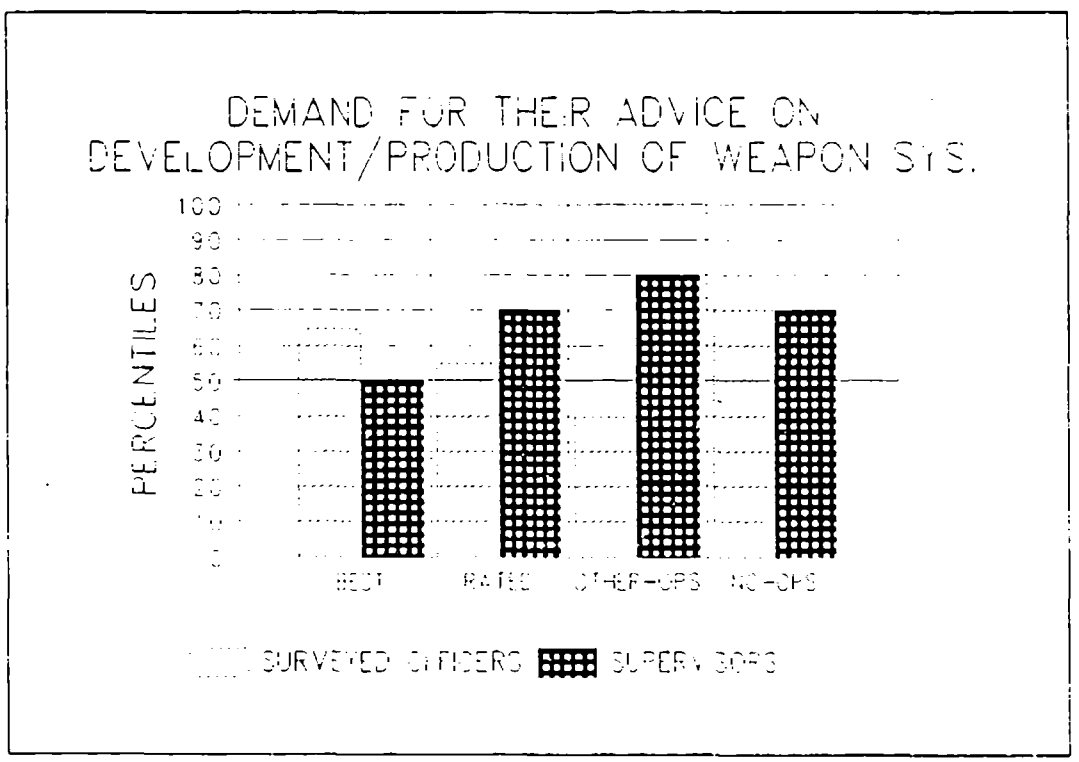

Figure 11. Median Responses for Survey Question 10

No statistical difference (at α=.05) was detected in the self reported frequency of officers sampled when called upon to provide their advice on matters affecting the development/production of weapon system(s)/component(s). However, it is worth noting that the median score for the sample of officers with no operational experience was the highest at 70% percent, and the same score was reported by their supervisors. There was no statistical difference based on supervisor ratings.

Survey Question 12. When it comes to influencing decisions affecting the capabilities of the weapon system(s)/component(s) that my organization develops/ produces, I do better than ____ of my peers whose jobs are similar to mine.

The results for question 12 are presented in Figure 12.

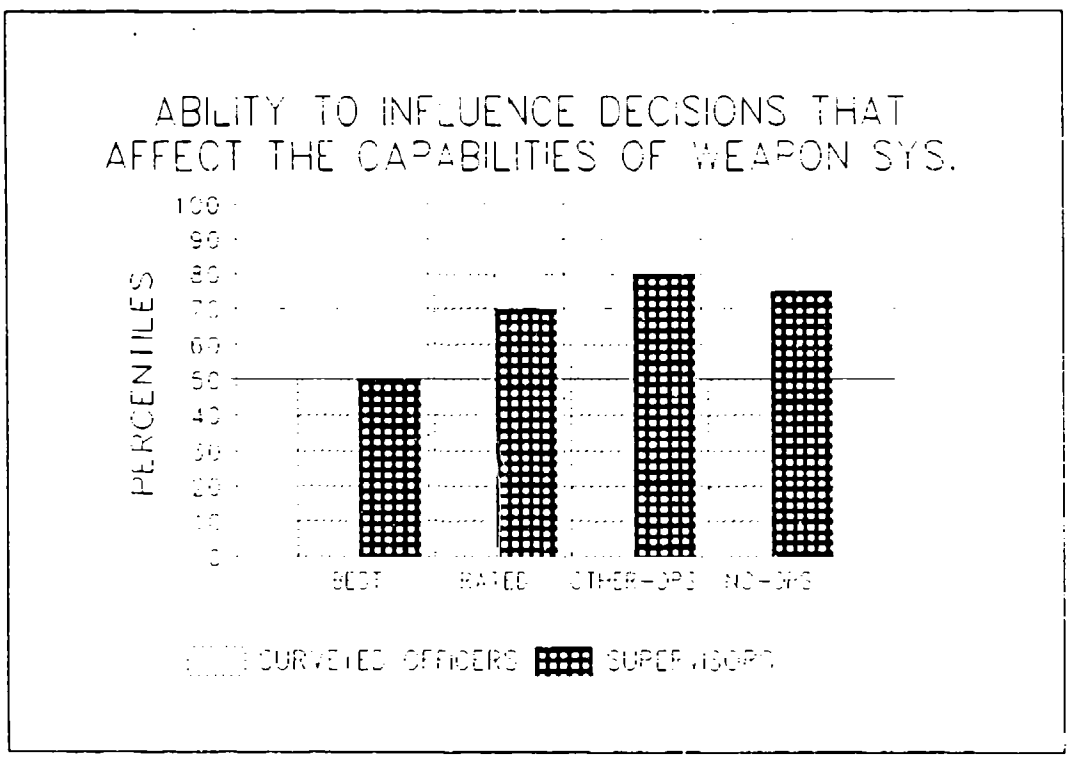

Figure 12. Median Responses for Survey Question 12

Question 12 was included to determine if operational experience enhances the ability of S&DE officers to influence decisions affecting the capabilities of weapon systems. No statistical difference (at α=.05) was detected in the self reported ability of officers sampled to influence decisions affecting the capabilities of weapon systems. However, it is worth noting that the median score of rated officers was the highest at 80 percent. There was no statistical difference based on supervisor ratings.

Survey Question 20. When it comes to providing advice on matters affecting the capabilities of the weapon system(s)/component(s) that my organization develops/ produces, I am called upon more often than ____ of my peers whose jobs are similar to mine.

The results for question 20 are presented in Figure 13.

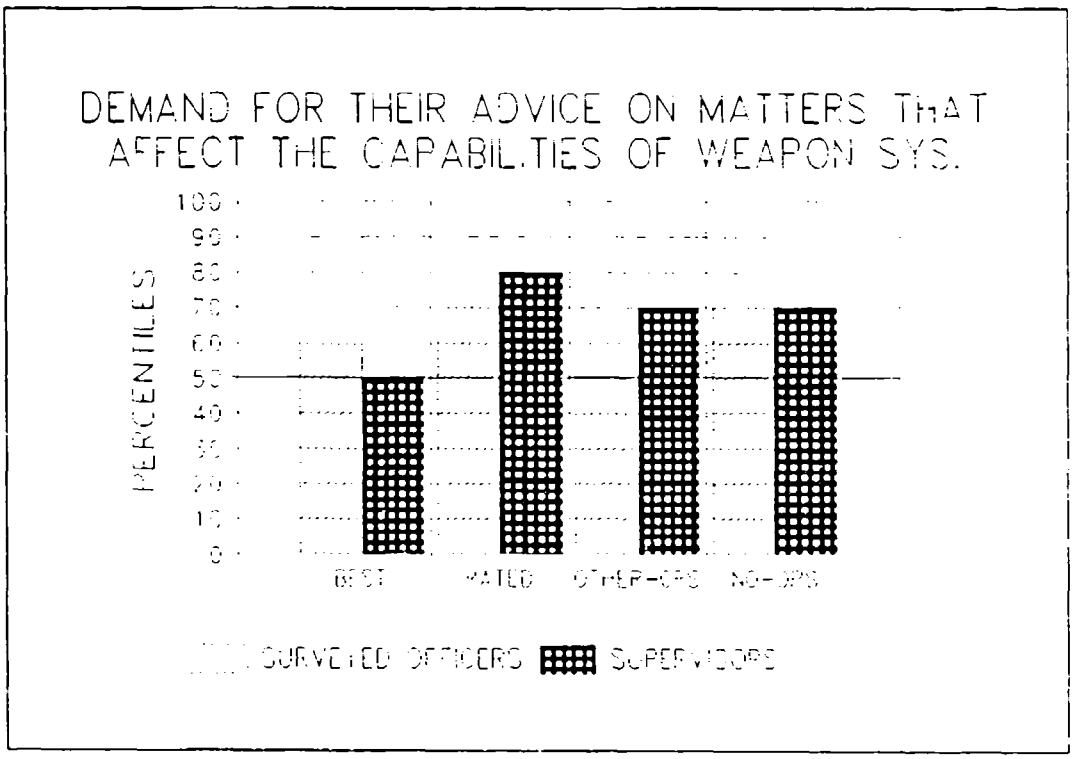

Figure 13. Median Responses for Survey Question 20

Question 20 was included to determine if operational experience enhances the opportunities of S&DE officers to provide advice on matters affecting the capabilities of weapon system(s)/component(s).

No statistical difference (at α=.05) was detected in the self reported opportunities of officers sampled to provide their advice on matters affecting the capabilities of weapon systems. There was no statistical difference based on supervisor ratings.

Survey Question 30. When it comes to providing my opini/on on decisions affecting the capabilities of the weapon system(s)/component(s) that my organization develops/produces, I am called upon more often than ____ of my peers whose jobs are similar to mine.

The results for question 30 are presented in Figure 14.

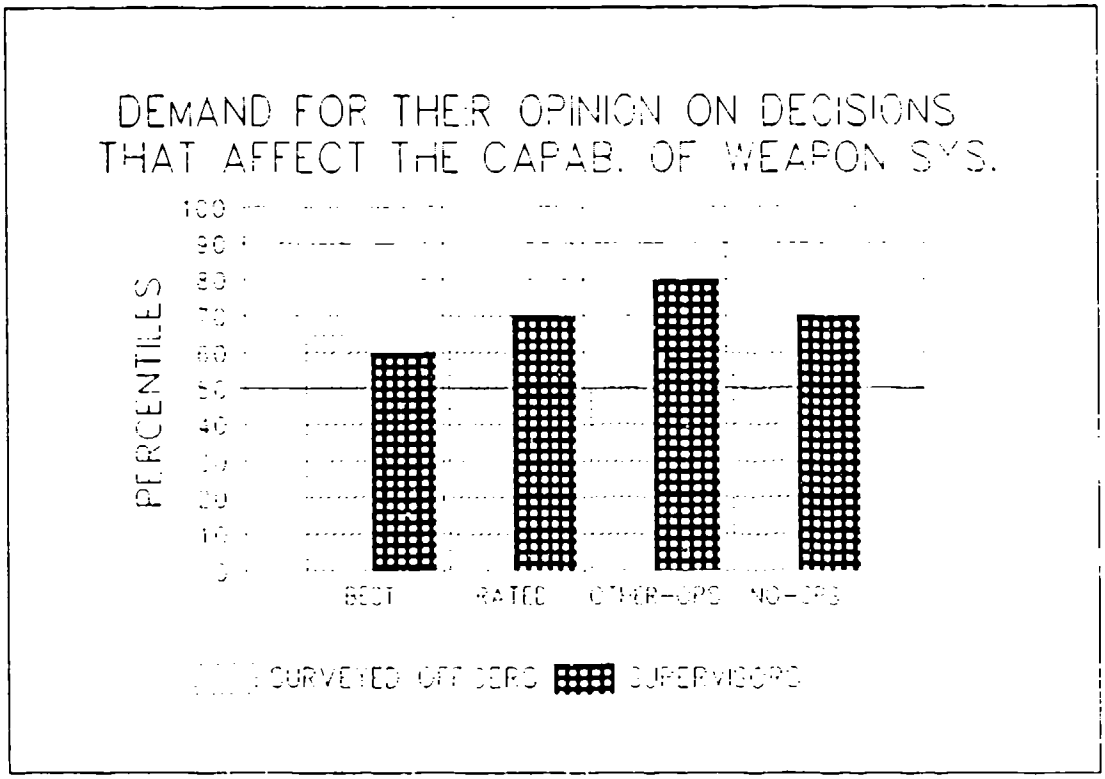

Figure 14. Median Responses for Survey Question 30

Question 30 was included to determine if operational experience enhances the opportunities of S&DE officers to provide their opinion on decisions affecting the capabilities of weapon system(s)/component(s).

No statistical difference (at α=.05) was detected in the self reported opportunities of officers sampled to provide their opinion on decisions affecting the capabilities of weapon systems. However, it is worth noting that the median score of rated officers was the highest (at 70 percent) between the officers sampled. In addition, the median score reported by supervisors of officers with other non-rated operational experience was 80 percent. There was no statistical difference based on supervisor ratings.

Survey Question 32. When it comes to influencing the decisions affecting the development/production of the weapon system(s)/component(s) in my organization, I do better than ____ of my peers whose jobs are similar to mine.

Question 32 was included to determine if operational experience enhances the ability of S&DE officers to influence decisions affecting the development/production of weapon system(s)/ component(s). The median responses from all samples for question 32 are presented in Figure 15.

The self reported ability of rated officers to influence decisions affecting the development/production of weapon systems/components was higher (at α=.05) than that of officers with no operational experience. There was no statistical difference based on supervisor ratings.

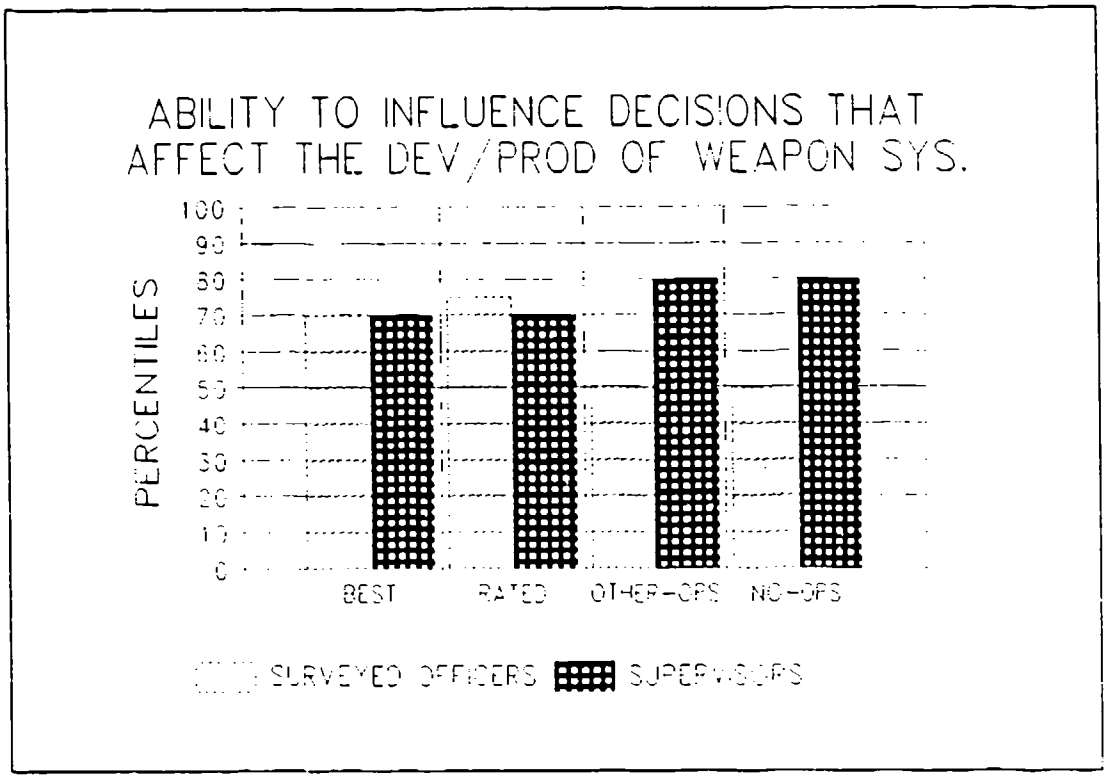

Figure 15. Median Responses for Survey Question 32

In summary, there was no practical difference in the level of credibility for their judgment between all samples of officers surveyed.

Investigative Question 4

Investigative question four explores how the relevancy of specific operational experience affects the ability of S&DE officers to develop useful operator-oriented systems. Question 45 was used to help answer investigative question four. Question 45 was designed to divide the samples of officers with operational experience into groups of officers possessing relevant operational experience, and officers

possessing irrelevant operational experience. Once divided, the results of the measurement questions for investigative questions one through four were to be analyzed and reported. However, this analysis was not possible because only two officers indicated their operational experience was irrelevant. The results from the supervisors could not be used either, because they were not asked to report whether the operational experience possessed by their subordinates was relevant to their jobs or not.

Measurement of Agreement: Supervisors and Subordinates

When the survey data was collected, the coded numbers on the answer sheets were used to identify matched pairs of supervisors and subordinates; eighteen pairs were obtained. The responses from each matched pair were used to obtain Spearman rank correlations for each of the 15 measurement questions. These correlations represent a measure of agreement between the way that supervisors and subordinates answered questions.

The results of the Spearman rank correlation were consistent with the results from the analysis conducted on the 15 measurement questions; namely, in general there was little agreement. The computed Spearman rank correlation coefficients are presented in Table 8.

Table 8

Measures of Agreement Between Supervisors and Subordinates

Question #	Spearman Rank Correlation Coefficients
10	.3440
11	.3567
12	.3094
13	.0413
14	.3007
17	.6271
19	.3751
20	.3195
22	.2345
24	-.2146
26	.2143
27	.0834
30	.1084
31	.4387
32	.0379

Ranking of Skills

In the second part of the survey the officers were asked to rank a list of skills, one of which was operational skills. The intent of this measurement scheme was not to determine if operational experience enhances the ability of S&DE officers to develop useful operator-oriented systems, but to investigate the relative importance of operational experience to the officer surveyed. Specifically, operational skills were ranked relative to decision making, communication, technical, leadership, and administrative

skills. The results of the rankings for each sample of officers is presented in Table 9. The supervisors were not asked to participate in the rankings.

Table 9

Ranking of Skills by Samples

	BEST		No Operational Exp.
1	Decision Making	1	Communication
2	Operational	2	Technical
3	Communication	3	Decision Making
4	Technical	4	Leadership
5	Leadership	5	Operational
6	Administrative	6	Administrative
	W =.397, sig at α=.05		W =.43, sig at α=.05
	Rated		Other-Ops
1	Communication	1	Leadership
*	Decision Making	2	Decision Making
*	Leadership	*	Technical
4	Operational	*	Communication
5	Technical	*	Operational
6	Administrative	6	Administrative
	W =.414, sig at α=.05		W =.34, not stat sig
	* Tied Rankings		

The results of the ranking and statistical tests indicate that officers from the BEST sample feel that operational skills are more important than officers with no operational experience, who ranked operational skills lower.

The first test conducted measures the comparative magnitude of the ranked skills (see Appendix E). The

results indicate that the officers in the BEST sample strongly felt (α=.1) that decision making and operational skills are more important than administrative skills. However, the officers with no operational experience strongly felt (α=.1) that communication, technical, decision making, and leadership skills are more important than administrative skills. In addition officers with no operational experience strongly felt (α=.1) that communication skills are more important than operational skills.

The coefficient of concordance W, which is a measure of agreement between the officers in each sample, was computed for all samples. When W is statistically significant, it means that the agreement between the officers in a sample is higher than it would be by chance (22:237). The agreement between officers with no operational experience was stronger than that of the officers from the BEST sample.

The rated officers and other non-rated officers with operational experience were more varied in their responses than officers in the BEST sample. This is indicated by the ties in the ranking of skills presented in Table 9. What the ties represent is that these officers did not feel strongly about the ranking of the tied skills.

Ranking of Knowledge Areas

The respondents also ranked a list of knowledge areas, two of which were tactics of deployment and maintenance

required to keep weapon systems working. The intent of this measurement scheme was not to determine if operational experience enhances the ability of S&DE officers to develop useful operator-oriented systems, but to investigate the relative importance of operational knowledge to the officer surveyed. The knowledge areas representing operational knowledge were maintenance and tactics of deployment. The other ranked areas were technology, threat, acquisition process, and acquisition regulations. The result of the rankings of knowledge areas for each sample of officers is presented in Table 10. The supervisors were not asked to participate in the rankings.

The results of the rankings and statistical tests indicate that the officers from the BEST sample and the officers with no operational experience ranked the knowledge areas in the same manner. The coefficients of concordance were high for both samples, and statistically significant at $\alpha=.05$.

The tests for the comparative magnitude of the ranked knowledge areas indicated that officers from the BEST sample strongly felt ($\alpha=.1$) that the areas of knowledge of technology to make the weapon system work, tactics of deployment, and maintenance were more important than knowledge of acquisition regulations. The officers with no operational experience felt the same way, but they also felt strongly ($\alpha=.1$) that knowledge of the threat was more important than knowledge of acquisition regulations. The

same test indicated that this last group of officers also felt strongly that knowledge of technology to make the weapon systems work was more important than knowledge of the acquisition process.

Table 10

Ranking of Knowledge Areas by Samples

	BEST		No Operational Exp.
1	Technology	1	Technology
2	Tactics of Deployment	2	Tactics of Deployment
3	Maintenance	3	Maintenance
4	Threat	4	Threat
5	Acquisition Process	5	Acquisition Process
6	Acquisition Regs	6	Acquisition Regs
	W =.556, sig at α=.05		W =.402, sig at α=.05
	Rated		Other-Ops
*	Threat	1	Technology
*	Tactics of Deployment	*	Maintenance
3	Acquisition Process	*	Threat
4	Technology	*	Acquisition Process
5	Maintenance	5	Tactics of Deployment
6	Acquisition Regs	6	Acquisition Regs
	W =.189, not stat sig		W =.172 not stat sig
	* Tied Rankings		

The result for the rated officers and other non-rated officers with operational experience indicate that there was very little agreement in the way they ranked the six knowledge areas. None of the statistical tests applied indicated any statistical significance.

Summary

This chapter described the results of the analysis of the data collected with the survey. The results indicated that officers from the BEST sample ranked themselves higher than officers with no operational experience in one out of the five questions measuring the ability to interpret operational requirements. However, rated officers ranked themselves higher than officers with no operational experience in two out of these five questions.

Officers from the BEST sample ranked themselves better in the questions measuring the ability to communicate with the using organization. In this area, officers from the BEST sample ranked themselves higher than officers with no operational experience in three out of the five questions, while rated officers ranked themselves higher in only one question.

On the questions measuring whether operational experience helps S&DE officers establish credibility for their judgement, only the rated officers ranked themselves higher than officers with no operational experience in one question.

In the effort to determine the relevancy of operational experience to specific S&DE jobs, the intended methodology was not successful. Only two of the officers with operational experience expressed that their operational experience was not relevant to their current jobs.

The ranking schemes included in the survey provided some insight regarding the importance of operational skills and knowledge to the officers surveyed. In ranking the skills, officers from the BEST sample ranked operational skills number two, while officers with no operational experience ranked it number five. The results from the other two samples were inconclusive.

In ranking the knowledge areas, officers in both the BEST sample and officers with no operational experience ranked the knowledge areas in the same way. Officers in both groups ranked the two knowledge areas associated with operational knowledge second and third. The results from the two other samples indicated lower agreement as to how officers in these samples perceived the importance of each of the knowledge areas.

Chapter V, Conclusions and Recommendations, will present the final outcome of this research study. The conclusions and recommendations presented in the next chapter are based on the outcome of the analyses conducted in this chapter.

V. Conclusions and Recommendations

Introduction

This research study was undertaken to determine if the operational experience gained by S&DE officers through the Broadening Experience Tour (BEST) program enhances their ability to develop useful operator-oriented systems. The officially stated benefits of operational experience to S&DE officers were found in Air Force Regulation 36-23, Officer Professional Development. These benefits are the enhanced ability to interpret operational requirements, communicate with the using organizations, and to help establish credibility for their judgement.

The results of this study do not apply to officers in all ranks in S&DE career fields. Inferences made apply only to officers with six to 11 years of active duty commissioned service time. This chapter presents a summary of key findings followed by implications. The limitations of the study, and topics not addressed by this study effort, are then presented, followed by the conclusion of the study. Finally, recommendations for further research studies are presented.

Summary of Key Findings

A summary of key findings is presented as each pertains to a specific survey question. Inferences on the

possible reasons for the results from the survey questions are presented as well.

Finding 1. Officers from the BEST sample ranked themselves higher than officers in all other samples in their ability to evaluate logistics support requirements. All the officers in the BEST sample had experience as aircraft maintenance officers, which should explain why they ranked higher than officers in all other samples. Although the rated officers had more years of experience with the actual weapon systems, their knowledge of logistics support was lower. Although it is not known if aircraft maintenance was the first choice of operational assignment of these officers, logistics support is an area that is always stressed in acquisition training and education.

Finding 2. Officers in the rated sample were the only officers to rank themselves higher than officers with no operational experience in their ability to read and understand operational deficiencies outlined in operational requirements documents. Understanding of operational requirements probably entails a broad knowledge of mission requirements. It is possible that rated experience provides better knowledge for the understanding of mission requirements than non-rated operational experience.

Finding 3. There was no difference in the ability of officers with and without operational experience to evaluate technical solutions to operational deficiencies. However, officers in the BEST sample ranked higher than officers with

other non-rated operational experience in this area. The difference detected between these two samples could be caused by more than one factor. The sample of officers with other non-rated operational experience had in general less acquisition experience, and were mostly program managers. The officers in the BEST sample had more acquisition experience and were mostly engineers.

Finding 4. No difference was found between any of the samples of officers surveyed in their ability to assess the appropriateness of performance parameters outlined in system level specifications and other technical documents. It is possible that the operational knowledge required to assess performance parameters could be acquired without being a user or a maintainer of a weapon system. The officers with no operational experience had in general more acquisition experience than officers with operational experience. It is possible through the course of their acquisition careers that these officers gained the knowledge required to make appropriate assessments of performance parameters.

Finding 5. Officers in the rated sample were the only officers to rank themselves higher than officers with no operational experience in their ability to evaluate test requirements needed to assess the military worthiness of weapon systems/components. On the other hand, supervisors of officers with no operational experience ranked their subordinates higher than the supervisors of the officers in the BEST sample. The fact that the rated officers ranked

themselves higher than officers with no operational experience may indicate that the type of operational experience is operative in enhancing the ability to evaluate test requirements.

Finding 6. Officers in the rated sample were the only officers to rank higher than officers with no operational experience in their ability to understand the language used in the operational requirements documents.

Finding 7. Officers from the BEST sample were the only officers to rank themselves higher than officers with no operational experience in their ability to understand the acronyms used by users and maintainers of weapon systems. The higher response from the BEST sample could be attributed to the homogeneous composition of the BEST sample (all maintenance officers), operational exposure (contact with users) or to the present assignment of these officers.

Finding 8. Officers from the BEST sample were the only officers to rank themselves higher than officers with no operational experience in their ability to determine the organization in the using command which can provide the various types of data required to do their work. One possible reason for this result is the type of operational experience. Although the rated officers had more years of operational experience than the officers in the BEST sample, it is possible that the officers in the BEST sample had to interface with more organizations in the using command than rated officers in order to do their jobs.

Finding 9. Officers from the BEST sample were the only officers to rank higher than officers with no operational experience in their ability to determine the type of data required by maintenance personnel to support weapon systems. Again this result appears to be caused by the fact that all officers in the BEST sample were aircraft maintenance officers.

Finding 10. Officers from the rated sample were the only officers to rank higher than officers with no operational experience in their ability to influence decisions affecting the development/production of weapon systems/components.

A possible reason why rated officers and not officers from the BEST sample ranked higher in their ability to influence development/production decisions could be attributed to the composition of these two groups. The vast majority of rated officers were program managers while the majority of officers in the BEST sample were engineers. In addition, the majority of the officers with no operational experience were engineers. Major decisions concerning development and production are normally made by program management not engineering.

Finding 11. Although there was a difference (at α=.05) in only one of the five questions designed to measure credibility, the results revealed a consistent pattern. The responses from all samples were close when responding to questions measuring the ability to provide advice and

opinions on matters and decisions affecting capabilities and the development/production of weapon systems. However, when asked about their ability to influence decisions, officers with operational experience rated themselves higher than officers without it. It is possible that operational experience is operative in the perceived ability of these officers to influence decisions.

Finding 12. Despite the fact that survey question 45 could not be used in the analysis, the results obtained for investigative questions one through three provide some insight into the relevancy of specific operational experience. The non-rated officers who obtained their operational experience prior to entering the S&DE career fields consistently ranked themselves lower than the other officers with operational experience in 12 out of the 15 measurement questions.

The sample of officers with other non-rated operational experience was the most heterogeneous in terms of specific operational experience. There were three aircraft maintenance officers, three missile officers, and one intelligence officer. In addition, the two officers who indicated that their operational experience was irrelevant also belonged to this sample. It could be argued that perhaps a lack of acquisition experience might have been the cause of the lower ranking. However, as a group these officers had more acquisition experience than the rated officers who consistently ranked themselves higher, and the

majority of the officers in both groups had the same S&DE AFSC (27XX).

Further, all rated officers had experience as users of aeronautical systems which are the main products of ASD. In addition, the responses of all three groups of officers with operational experience were combined and compared with the responses from the officers with no operational experience. The median tests conducted did not indicate any significant statistical differences between the median scores of officers with operational experience (when combined) and those without it. This last finding suggests that relevancy of specific experience could be an influential factor.

The way in which the measurement questions were constructed, could also provide some insight into the relevance of specific operational experience. Question 11 turned out to be more specific than intended. Question 11 measured the ability to evaluate logistics support. The BEST officers, all of which had aircraft maintenance experience, ranked themselves higher than the officers in all other samples. This finding suggests that if the job requires specific knowledge of logistic support, an officer with aircraft maintenance experience should be employed. Therefore, these other unintended results tend to support the premise that specific operational experience is relevant to the development of useful operator-oriented systems.

Finding 13. Officers from the BEST sample consider operational skills more important than officers with

operational experience. It would be difficult to assess to what extent this result is attributed to the experience gained through the BEST program; it could be assumed that operational experience was important to these officers since they volunteered for the program.

Implications

This section presents possible implications derived from the key findings presented in the preceding section. Due to the research design applied in this study, the implications presented here are applicable only to officers with six to 11 years of active duty commissioned time. The specific implications are presented below:

1. Since aircraft maintenance experience appears to have the most impact in enhancing communication abilities, officers with 28XX primary AFSCs returning from aircraft maintenance duties should be allowed to crossflow to the 27XX career field early. The rationale for this implication is that officers in 27XX career fields have to communicate with a wider variety of organizations than officers in 28XX career fields. Therefore, the officer's operational experience can be used where it will be most beneficial.

2. Rated officers should be assigned to jobs that require good knowledge of mission requirements.

3. Evaluation of technical solutions to operational deficiencies is probably more dependent on technical competence than on operational experience.

4. Operational experience is not always required to assess the appropriateness of performance parameters outlined in system level specifications and other operational documents.

5. Evaluation of test requirements requires both operational and acquisition expertise.

6. Due to the balance of acquisition and operational experience, officers who participate in the BEST program are in general better able to communicate with the rated officers.

7. Operational experience in general does not enhance the credibility of S&DE officers for their judgment.

8. Operational experience is best utilized when relevant to the S&DE assignment.

Limitations

This research study focused on areas of acquisition where operational experience is believed to help the most. Therefore, many skills required in acquisition were not studied. Some of the skills not included in this study are: the ability to schedule and monitor contract actions; the ability to manage financial resources; the ability develop acquisition strategies; and the ability to conduct successful design reviews. Therefore, further research is required to fully measure the impact of operational experience.

Conclusion of Study

The specific implications presented in this chapter serve as the foundation for the general conclusion that the operational experience obtained by S&DE officers through the BEST program has some effect in enhancing their ability to develop useful operator-oriented systems as defined by Air Force Regulation 80-21. Further, their abilities are most enhanced with respect to communicating with the using commands. The long term effects of operational experience acquired through the BEST program on the various abilities of the officers who participated are not known since the results of this study apply only to the period of time

immediately following the return of these officers from operational jobs. It is possible that being absent from acquisition for four years could have an effect in their ability to immediately realize the full potential of their operational experience.

It is possible that operational experience has a greater impact in the abilities of higher ranking S&DE officers, but this is a subject for future study.

Recommendation for Further Research

The main recommendation based on the results of this research effort is to conduct a longitudinal study of the effects of operational experience on the abilities of S&DE officers. However, for the recommended action to be successful there must be complete support and dedication to the study by the personnel offices at the Air Force Materiel Command and Air Force Headquarters, since such a study will require years to complete. A survey should be administered to the officers selected to participate in the BEST program prior to the start of their operational assignment. The same survey should then be administered some time after returning to S&DE duties, and the results compared to measure for treatment effects.

In addition, the survey should also be administered to all S&DE officers with operational experience to determine the point in their career where operational experience is most useful; and to determine the effects which the

relevancy of that specific operational experience has on the abilities of S&DE officers. The effects that specific operational experience might have in the effectiveness of S&DE officers in the different product divisions should be studied. This research is necessary, because of the reductions in force expected in the near future. The full effects of operational experience should be studied and understood so the Air Force can wisely pursue the infusion of the operational point of view at a minimum cost to the Air Force.

The suggested research study should start with an effort to identify any other possible benefits of operational experience. It is not clear how the benefits outlined in AFR 36-23 were determined or how encompassing they are. The delphi technique should be applied by a group of S&DE officers and supervisors at various levels to determine all the perceived benefits of operational experience. Once these benefits are identified, another session should be assembled to determine how to construct the measurement questions.

Once the new survey is constructed and pretested, it should be sent to officers of all ranks both with and without operational experience in all product divisions of Air Force Systems Command. The results should then be used to study the effects of operational experience at various points in the careers of S&DE officers.

Appendix A. Subordinate Survey

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AERONAUTICAL SYSTEMS DIVISION (AFSC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6503

REPLY TO ATTN OF: CY

1 July 1991

SUBJECT: Survey on Job Skills of Acquisition Personnel

TO: Survey Recipient

1. On 26 December 1990, AF Regulation 36-27, Acquisition Professional Development, was published in recognition of the need to improve the preparation of all personnel involved in the acquisition of weapon systems in the Air Force. As a recipient of this survey, you are in a position to contribute to a research project set out to aid in the process of professional development of acquisition personnel. The data collected will be used to identify the critical factors affecting the ability of acquisition personnel to develop effective weapons systems for the Air Force. This is an AFIT thesis project sponsored by HQ AFSC/DPR0A2.

2. Please take 10 - 15 minutes to complete the attached survey and return it NLT 15 July 1991. Your individual response will be treated as confidential.

3. Your participation in this study is completely voluntary, but we would greatly appreciate your help. For further information, please contact the faculty advisor for this research project, Capt Kevin Grant at DSN 785-3379.

GEORGE R. WINTERS II, Col, USAF
Deputy Chief of Staff,
Program Management

3 Atch
1. Survey
2. Answer Sheet
3. Return Envelope

SURVEY 1 July 1991
ON
JOB SKILLS
OF ACQUISITION PERSONNEL

Instructions

Please answer all questions. Read each question carefully before selecting your answer. Use a number two pencil to circle your answer on the survey and to darken the circle on the machine scoreable answer sheet (AFIT Data Collection Form). As you complete the survey, make sure your answers on the answer sheet match the questions you are actually answering. If you decide to change any of your answers, erase the incorrect mark completely on both the survey and the answer sheet. Please do not fold, staple, or tear the answer sheet.

To ensure your response remains anonymous, please **do not** write your name or social security number on either the survey or the answer sheet.

Please do not discuss the results of this survey with your peers or supervisor.

Background Information

1. What is your current rank?

   a. First Lieutenant
   b. Captain
   c. Major
   d. Lieutenant Colonel
   e. Colonel

2. What is your current duty AFSC?

   a. 26XX
   b. 27XX
   c. 28XX
   d. 65XX
   e. 67XX

3. How many years of acquisition experience (experience in 26XX, 27XX, 28XX, 65XX, & 67XX utilization fields) do you possess?

   a. Less than 2 years
   b. 2 years, but less than 4 years
   c. 4 years, but less than 6 years
   d. 6 years, but less than 8 years
   e. 8 years, but less than 10 years
   f. 10 years or more

4. Indicate your aeronautical rating?

a. Pilot
b. Navigator
c. None

5. Indicate if you possess a primary, secondary, or tertiary AFSC in any of the following utilization fields: (If you possess more than one of the following AFSCs, please indicate the one where you spent the most time.)

a. 16XX
b. 17XX
c. 18XX
d. 20XX
e. 25XX
f. 31XX
g. 40XX
h. 80XX
i. 81XX
j. none

6. How many years of operational experience do you have? (Operational experience is defined as years performing the duties of pilot, navigator or the duties in any of the AFSCs listed in question 5)

a. Less than 2 years
b. 2 years, but less than 4 years
c. 4 years, but less than 6 years
d. 6 years, but less than 8 years
e. 8 years, but less than 10 years
f. 10 years or more
g. none

7. To which of the following organizations are you currently assigned?

a. AD
b. ASD
c. BMO
d. ESD
e. MSD
f. Other

8. What is your primary undergraduate education?

a. Technical (i.e. engineering, science-related)
b. Non-technical (i.e., humanities, or business related)
c. Both technical and non-technical (i.e., two different degrees)

9. What is your primary graduate education?

a. none
b. Technical (i.e., engineering, science-related)
c. Non-technical (i.e., humanities, or business-related)
d. Both technical and non-technical (i.e. two different degrees)

Study Questions

EXAMPLE

The following is an example of the correct way to answer questions 10 to 32:

85. When it comes to having good interpersonal relations with others in my organization, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

Selection of response **e.** would indicate that you do better than 80 percent of your peers whose jobs are similar to yours when it comes to having good interpersonal relations with others in your organization.

10. When it comes to providing advice on matters affecting the development/production of the weapon systems(s)/component(s) in my organization, I am called upon more often than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

11. When it comes to evaluating the logistics support required to maintain the weapon system(s)/component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

12. When it comes to influencing decisions affecting the capabilities of the weapon systems(s)/component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

13. When it comes to briefing the users of the weapon system(s)/ component(s) that my organization develops/produces, I do better than ___ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

14. When it comes to reading and comprehending the operational deficiencies outlined in operational requirements documents such as the Statement of Need (SON), the Statement of Operational Requirements Document (SORD), Operational Requirements Document (ORD), and the Mission Need Statement (MNS), I do better than _____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

15. When it comes to communicating clearly in my organization, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

16. When it comes to helping others to solve problems in my organization, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

17. When it comes to understanding the language used in operational requirements documents such as the Statement of Need (SON), the Statement of Operational Requirements Document (SORD), Operational Requirements Document (ORD), and the Mission Need Statement (MNS), I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

18. When I attend program reviews related to the weapon system(s)/component(s) that my organization develops/produces, I contribute more than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

19. When evaluating alternative technical solutions to the operational deficiencies which will be corrected by the weapon system(s)/component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

20. When it comes to providing advice on matters affecting the capabilities of the weapon system(s)/component(s) that my organization develops/produces, I am called upon more often than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

21. When it comes to knowledge of the various acquisition regulations (i.e., Air Force regulations, Military Standards, and the Federal Acquisition Regulations (FARs)), I know more than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f	g.

22. When assessing the appropriateness of performance parameters outlined in system level specifications and other technical documents, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

23. When it comes to overall contribution to the mission of my organization, I contribute more than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

24. When it comes to understanding the acronyms used by the users and maintainers of the weapon system(s)/component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

25. When assessing technical risks involved in the development/production of weapon system(s)/component(s) in my organization, I do better than ___ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

26. When evaluating the test requirements needed to assess the military worthiness of the weapon system(s)/component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

27. When it comes to determining the organization in the using command which can provide the various types of data required to do my work, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

28. When it comes to encouraging open communication between the team members in my organization, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

29. When it comes to knowledge of the various technologies required to make the weapon system(s)/component(s) that my organization develops/produces work, I do know more than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

30. When it comes to providing my opinion on decisions affecting the capabilities of the weapon system(s)/component(s) that my organization develops/produces, I am called upon more often than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

31. When determining the type of data required by maintenance personnel to support the weapon system(s)/component(s) that my organization develops/produces, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

32. When it comes to influencing decisions affecting the development/production of the weapon system(s)/component(s) in my organization, I do better than ____ of my peers whose jobs are similar to mine.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

33.-38. How important do you think the following skills are to officers involved in the development and production of useful operator-oriented weapon systems?

Rank the following skills based on their relative importance. Record the numerical rank in the blank. Assign a different number to each of the six skills. Please record the letter corresponding to each rank on the answer sheet.

Most Important 1	2	3	4	5	Least Important 6
a.	b.	c.	d.	e.	f.

33. ____ Technical skills

34. ____ Communication skills

35. ____ Decision making skills

36. ____ Operational skills (experience in the use or maintenance of weapon systems/components)

37. ____ Administrative skills

38. ____ Leadership skills

(Continue on next page)

39.- 44. How important do you think the following knowledge areas are to officers involved in the development and production of useful operator-oriented weapon systems?

Rank the following knowledge areas based on their relative importance. Record the numerical rank in the blank. Assign a different number to each of the knowledge areas. Please record the letter corresponding to each rank on the answer sheet.

Most Important					Least Important
1	2	3	4	5	6
a.	b.	c.	d.	e.	f.

39. ____ Knowledge of the technology required to make the weapon system work.

40. ____ Knowledge of the maintenance required to keep the weapon system working.

41. ____ Knowledge of Federal Acquisition Regulations (FARs) and the Air Force regulations relevant to the acquisition of weapon systems.

42. ____ Knowledge of the threat affecting the capability of the weapon system.

43. ____ Knowledge of the acquisition process.

44. ____ Knowledge of the tactics of deployment of the weapon system.

45. If you have rated or non-rated operational experience, how relevant do you think this experience is to the development of the weapon systems that your organization develops?

a. Completely Irrelevant
b. Not so Relevant
c. Relevant
d. Highly Relevant
e. This question is NOT APPLICABLE (i.e., no operational experience).

PLEASE RETURN THE SURVEY AND ANSWER SHEET IN THE RETURN ENVELOPE PROVIDED THROUGH LOCAL DISTRIBUTION.

THANKS FOR YOUR HELP AND HAVE A NICE DAY!

Appendix B. Supervisor Survey

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AERONAUTICAL SYSTEMS DIVISION (AFSC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6503

REPLY TO ATTN OF CY

1 July 1991

SUBJECT Survey on Job Skills of Acquisition Personnel

TO The Supervisor Of:

1. On 26 December 1990, AF Regulation 36-27, Acquisition Professional Development, was published in recognition of the need to improve the preparation of all personnel involved in the acquisition of weapon systems in the Air Force. As a recipient of this survey, you are in a position to contribute to a research project set out to aid in the process of professional development of acquisition personnel. What is needed from you is to rate your subordinate in the categories outlined in the survey. The data collected will be used to identify the critical factors affecting the ability of acquisition personnel to develop effective weapons systems for the Air Force. This is an AFIT thesis project sponsored by HQ AFSC/DPROA2.

2. Please take 10 - 15 minutes to complete the attached survey and return it NLT 15 July 1991. Your individual response will be treated as confidential.

3. Your participation in this study is completely voluntary, but we would greatly appreciate your help. For further information, please contact the faculty advisor for this research project, Capt Kevin Grant at DSN 785-3375.

GEORGE R. WINTERS II, Col, USAF
Deputy Chief of Staff,
Program Management

3 Atch
1. Survey
2. Answer Sheet
3. Return Envelope

SURVEY
ON
JOB SKILLS
OF ACQUISITION PERSONNEL

1 July 1991

Instructions

Please answer all questions. Read each question carefully before selecting your answer. Use a number two pencil to circle your answer on the survey and to darken the circle on the machine scoreable answer sheet (AFIT Data Collection Form). A you complete the survey, make sure your answers on the answer sheet match the questions you are actually answering. If you decide to change any of your answers, erase the incorrect mark completely on both the survey and the answer sheet. Please do not fold, staple, or tear the answer sheet.

To ensure your response remains anonymous, please do not write your name or social security number on either the survey or answer sheet.

EXAMPLE

The following is an example of the correct way to answer questions 10 to 32:

85. When it comes to having good interpersonal relations with otners in my organization, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

Selection of response **e.** would indicate that your subordinate does better than 80% of his/her peers whose jobs are similar to his/hers when it comes to having good interpersonal relations with others in your organization.

1. When it comes to providing advice on matters affecting the development/production of the weapon systems(s)/ component(s) in my organization, I call upon my subordinate more often than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

2. When it comes to evaluating the logistics support required to maintain the weapon system(s)/component(s) that my organization develops/produces, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

3. When it comes to influencing decisions affecting the capabilities of the weapon systems(s)/component(s) that my organization develops/produces, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

4. When it comes to briefing the users of the weapon system(s)/ component(s) that my organization develops/ produces, my subordinate does better than ___ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c	d.	e.	f.	g.

5. When it comes to reading and comprehending the operational deficiencies outlined in operational requirements documents such as the Statement of Need (SON), the Statement of Operational Requirements Document (SORD), Operational Requirements Document (ORD), and the Mission Need Statement (MNS), my subordinate does better than _____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

6. When it comes to communicating clearly in my organization, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

7. When it comes to helping others to solve problems in my organization, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

8. When it comes to understanding the language used in operational requirements documents such as the Statement of Need (SON), the Statement of Operational Requirements Document (SORD), Operational Requirements Document (ORD), and the Mission Need Statement (MNS), my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

9. When my subordinate attends program reviews related to the weapon system(s)/component(s) that my organization develops/produces, he/she contributes more than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

10. When evaluating alternative technical solutions to the operational deficiencies which will be corrected by the weapon system(s)/component(s) that my organization develops/produces, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

11. When it comes to providing advice on matters affecting the capabilities of the weapon system(s)/component(s) that my organization develops/produces, I call upon my subordinate more often than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

12. When it comes to knowledge of the various acquisition regulations (i.e., Air Force regulations, Military Standards, and the Federal Acquisition Regulations (FARs)), my subordinate does know more than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

13. When assessing the appropriateness of performance parameters outlined in system level specifications and other technical documents, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

14. When it comes to overall contribution to the mission of my organization, my subordinate contributes more than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

15. When it comes to understanding the acronyms used by the users and maintainers of the weapon system(s)/component(s) that my organization develops/produces, My subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

16. When assessing technical risks involved in the development/production of weapon system(s)/component(s) in my organization, my subordinate does better than ___ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

17. When evaluating the test requirements needed to assess the military worthiness of the weapon system(s)/component(s) that my organization develops/produces, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

18. When it comes to determining the organization in the using command which can provide the various types of data required to do his/her work, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

19. When it comes to encouraging open communication between the team members in my organization, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

20. When it comes to knowledge of the various technologies required to make the weapon system(s)/component(s) that my organization develops/produces work, my subordinate does know more than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

21. When it comes to providing his/hers opinion on decisions affecting the capabilities of the weapon system(s)/component(s) that my organization develops/produces, I call upon my subordinate more often than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

22. When determining the type of data required by maintenance personnel to support the weapon system(s)/component(s) that my organization develops/produces, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

23. When it comes to influencing decisions affecting the development/production of the weapon system(s)/component(s) in my organization, my subordinate does better than ____ of his/her peers whose jobs are similar to his/hers.

≤40%	50%	60%	70%	80%	90%	95%
a.	b.	c.	d.	e.	f.	g.

PLEASE RETURN THE SURVEY AND THE ANSWER SHEET IN THE RETURN ENVELOPE PROVIDED THROUGH LOCAL DISTRIBUTION.

THANKS FOR YOUR HELP AND HAVE A NICE DAY!

Appendix C: Output of Cronbach's Alpha Computations

Computations for Complete Measuring Scale
The SAS System 16:20 Wednesday, July 31, 1991

Correlation Analysis

5 'VAR' Variables: INTERP11 INTERP14 INTERP19 INTERP22 INTERP26

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
INTERP11	45	3.0444	2.0555	137.0000	1.0000	7.0000
INTERP14	45	3.8444	2.0666	173.0000	1.0000	7.0000
INTERP19	45	3.3333	1.9540	150.0000	1.0000	7.0000
INTERP22	45	3.0889	1.7687	139.0000	1.0000	7.0000
INTERP26	45	3.6667	2.2259	165.0000	1.0000	7.0000

Correlation Analysis
Cronbach Coefficient Alpha

for RAW variables : 0.838012
for STANDARDIZED variables: 0.839368

Deleted	Raw Variables		Std. Variables	
Variable	Correlation with Total	Alpha	Correlation with Total	Alpha
INTERP11	0.439639	0.859153	0.436745	0.860771
INTERP14	0.779779	0.764506	0.775992	0.768936
INTERP19	0.732899	0.780176	0.737340	0.780167
INTERP22	0.605942	0.815508	0.607411	0.816447
INTERP26	0.673753	0.796517	0.673819	0.798185

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / N = 45

	INTERP11	INTERP14	INTERP19	INTERP22	INTERP26
INTERP11	1.00000	0.47248	0.38100	0.26769	0.34605
	0.0	0.0010	0.0098	0.0754	0.0199
INTERP14	0.47248	1.00000	0.69414	0.53861	0.68018
	0.0010	0.0	0.0001	0.0001	0.0001
INTERP19	0.38100	0.69414	1.00000	0.62911	0.58524
	0.0098	0.0001	0.0	0.0001	0.0001
INTERP22	0.26769	0.53861	0.62911	1.00000	0.51571
	0.0754	0.0001	0.0001	0.0	0.0003
INTERP26	0.34605	0.68018	0.58524	0.51571	1.00000
	0.0199	0.0001	0.0001	0.0003	0.0

Correlation Analysis

5 'VAR' Variables: COMM13 COMM17 COMM24 COMM27 COMM31

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
COMM13	44	3.8636	1.8751	170.0000	1.0000	7.0000
COMM17	45	3.8222	2.0033	172.0000	1.0000	7.0000
COMM24	45	4.3111	2.0541	194.0000	1.0000	7.0000
COMM27	44	3.4091	1.8964	150.0000	1.0000	7.0000
COMM31	45	3.4222	2.2001	154.0000	1.0000	7.0000

Correlation Analysis
Cronbach Coefficient Alpha

for RAW variables : 0.838771
for STANDARDIZED variables: 0.841553

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
COMM13	0.654266	0.803506	0.655058	0.806934
COMM17	0.559069	0.828414	0.561813	0.831948
COMM24	0.648412	0.804303	0.644543	0.809811
COMM27	0.718137	0.786378	0.731508	0.785579
COMM31	0.640926	0.807669	0.639811	0.811101

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	COMM13	COMM17	COMM24	COMM27	COMM31
COMM13	1.00000	0.53809	0.42499	0.66153	0.46047
	0.0	0.0002	0.0040	0.0001	0.0017
	44	44	44	43	44
COMM17	0.53809	1.00000	0.40589	0.45841	0.42995
	0.0002	0.0	0.0057	0.0018	0.0032
	44	45	45	44	45
COMM24	0.42499	0.40589	1.00000	0.61738	0.60897
	0.0040	0.0057	0.0	0.0001	0.0001
	44	45	45	44	45
COMM27	0.66153	0.45841	0.61738	1.00000	0.54526
	0.0001	0.0018	0.0001	0.0	0.0001
	43	44	44	44	44
COMM31	0.46047	0.42995	0.60897	0.54526	1.00000
	0.0017	0.0032	0.0001	0.0001	0.0
	44	45	45	44	45

Correlation Analysis

5 'VAR' Variables: CREDIB10 CREDIB12 CREDIB20 CREDIB30 CREDIB32

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
CREDIB10	45	3.1333	1.8902	141.0000	1.0000	7.0000
CREDIB12	45	3.3111	1.7942	149.0000	1.0000	7.0000
CREDIB20	44	3.5000	2.0403	154.0000	1.0000	7.0000
CREDIB30	45	3.2889	1.8043	148.0000	1.0000	7.0000
CREDIB32	44	3.4318	1.8727	151.0000	1.0000	7.0000

Correlation Analysis
Cronbach Coefficient Alpha

for RAW variables : 0.928477
for STANDARDIZED variables: 0.929882

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
CREDIB10	0.735427	0.926662	0.737573	0.928389
CREDIB12	0.770196	0.919944	0.769800	0.922372
CREDIB20	0.801601	0.915127	0.800397	0.916583
CREDIB30	0.891098	0.897449	0.890338	0.899137
CREDIB32	0.871848	0.900454	0.879634	0.901247

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	CREDIB10	CREDIB12	CREDIB20	CREDIB30	CREDIB32
CREDIB10	1.00000 0.0 45	0.56382 0.0001 45	0.69546 0.0001 44	0.72815 0.0001 45	0.68930 0.0001 44
CREDIB12	0.56382 0.0001 45	1.00000 0.0 45	0.67628 0.0001 44	0.75087 0.0001 45	0.78220 0.0001 44
CREDIB20	0.69546 0.0001 44	0.67628 0.0001 44	1.00000 0.0 44	0.75702 0.0001 44	0.73454 0.0001 43
CREDIB30	0.72815 0.0001 45	0.75087 0.0001 45	0.75702 0.0001 44	1.00000 0.0 45	0.88437 0.0001 44
CREDIB32	0.68930 0.0001 44	0.78220 0.0001 44	0.73454 0.0001 43	0.88437 0.0001 44	1.00000 0.0 44

Computations for Corrected Measuring Scale

The SAS System 18:50 Monday, August 5, 1991 1

Correlation Analysis

5 'VAR' Variables: INTERP11 INTERP14 INTERP19 INTERP22 INTERP26

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
INTERP11	24	4.2083	1.7189	101.0000	2.0000	7.0000
INTERP14	24	5.0000	1.6940	120.0000	2.0000	7.0000
INTERP19	24	4.3333	1.8337	104.0000	2.0000	7.0000
INTERP22	24	3.9583	1.6545	95.0000	2.0000	7.0000
INTERP26	24	4.7083	1.9667	113.0000	2.0000	7.0000

Correlation Analysis
Cronbach Coefficient Alpha

for RAW variables : 0.726921
for STANDARDIZED variables: 0.725848

Deleted Variable	Raw Variables Correlation with Total	Alpha	Std. Variables Correlation with Total	Alpha
INTERP11	0.195208	0.781979	0.198585	0.782813
INTERP14	0.693936	0.599429	0.687176	0.595549
INTERP19	0.654093	0.609542	0.655891	0.609110
INTERP22	0.432217	0.700395	0.430465	0.700302
INTERP26	0.506762	0.673285	0.503142	0.672128

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / N = 24

	INTERP11	INTERP14	INTERP19	INTERP22	INTERP26
INTERP11	1.00000	0.35836	0.00460	0.09491	0.16023
	0.0	0.0855	0.9830	0.6591	0.4545
INTERP14	0.35836	1.00000	0.64388	0.31026	0.53508
	0.0855	0.0	0.0007	0.1401	0.0071
INTERP19	0.00460	0.64388	1.00000	0.62103	0.51039
	0.9830	0.0007	0.0	0.0012	0.0108
INTERP22	0.09491	0.31026	0.62103	1.00000	0.22326
	0.6591	0.1401	0.0012	0.0	0.2943
INTERP26	0.16023	0.53508	0.51039	0.22326	1.00000
	0.4545	0.0071	0.0108	0.2943	0.0

Correlation Analysis

5 'VAR' Variables: COMM13 COMM17 COMM24 COMM27 COMM31

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
COMM13	24	4.5000	1.6940	108.0000	2.0000	7.0000
COMM17	24	4.1667	1.7856	100.0000	2.0000	7.0000
COMM24	24	5.0000	1.8178	120.0000	2.0000	7.0000
COMM27	24	3.9583	1.7565	95.0000	2.0000	7.0000
COMM31	24	4.5000	1.6681	108.0000	2.0000	7.0000

Correlation Analysis
Cronbach Coefficient Alpha

for RAW variables : 0.899883
for STANDARDIZED variables: 0.899590

Deleted Variable	Raw Variables Correlation with Total	Raw Variables Alpha	Std. Variables Correlation with Total	Std. Variables Alpha
COMM13	0.768955	0.874220	0.764462	0.874497
COMM17	0.741071	0.880209	0.741659	0.879486
COMM24	0.819107	0.862421	0.822215	0.861639
COMM27	0.752276	0.877651	0.753726	0.876852
COMM31	0.676869	0.893371	0.673344	0.894137

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / N = 24

	COMM13	COMM17	COMM24	COMM27	COMM31
COMM13	1.00000	0.70433	0.76246	0.70871	0.43082
	0.0	0.0001	0.0001	0.0001	0.0356
COMM17	0.70433	1.00000	0.62956	0.65386	0.55468
	0.0001	0.0	0.0010	0.0005	0.0049
COMM24	0.76246	0.62956	1.00000	0.61278	0.75994
	0.0001	0.0010	0.0	0.0015	0.0001
COMM27	0.70871	0.65386	0.61278	1.00000	0.60098
	0.0001	0.0005	0.0015	0.0	0.0019
COMM31	0.43082	0.55468	0.75994	0.60098	1.00000
	0.0356	0.0049	0.0001	0.0019	0.0

Correlation Analysis

5 'VAR' Variables: CREDIB10 CREDIB12 CREDIB20 CREDIB30 CREDIB32

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
CREDIB10	28	3.8571	1.6934	108.0000	2.0000	7.0000
CREDIB12	28	4.0357	1.6439	113.0000	2.0000	7.0000
CREDIB20	28	4.3929	1.6852	123.0000	2.0000	7.0000
CREDIB30	28	4.1071	1.6407	115.0000	2.0000	7.0000
CREDIB32	28	4.2500	1.6694	119.0000	2.0000	7.0000

Correlation Analysis
Cronbach Coefficient Alpha

for RAW variables : 0.923670
for STANDARDIZED variables: 0.923874

	Raw Variables		Std. Variables	
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha
CREDIB10	0.699415	0.926279	0.699621	0.926208
CREDIB12	0.760676	0.914136	0.760362	0.914608
CREDIB20	0.806380	0.905287	0.806894	0.905518
CREDIB30	0.846168	0.897538	0.846039	0.897733
CREDIB32	0.898949	0.886618	0.899570	0.886880

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / N = 28

	CREDIB10	CREDIB12	CREDIB20	CREDIB30	CREDIB32
CREDIB10	1.00000	0.58729	0.59143	0.67224	0.68124
	0.0	0.0010	0.0009	0.0001	0.0001
CREDIB12	0.58729	1.00000	0.75680	0.65768	0.71189
	0.0010	0.0	0.0001	0.0001	0.0001
CREDIB20	0.59143	0.75680	1.00000	0.70757	0.79317
	0.0009	0.0001	0.0	0.0001	0.0001
CREDIB30	0.67224	0.65768	0.70757	1.00000	0.92288
	0.0001	0.0001	0.0001	0.0	0.0001
CREDIB32	0.68124	0.71189	0.79317	0.92288	1.00000
	0.0001	0.0001	0.0001	0.0001	0.0

Appendix D: Median Test Results

Legend:

	GRP#
Sample of BEST officers	1
Sample of other non-rated officers w/ops	2
Sample of rated officers	3
Sample of officers w/o ops	4
Supervisors of BEST officers	5
Supervisors of other non-rated officers w/ops	6
Supervisors of rated officers	7
Supervisors of officers w/o ops	8
All officers with operational experience	9

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	1	6
BELOW MEDIAN	1	6	7
TOTAL	6	7	13
TIES WITH MEDIAN	2	0	2

MEDIAN VALUE 5.000
CHI SQUARE 6.20 DF 1 P VALUE 0.0128
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	3	1	4
BELOW MEDIAN	2	5	7
TOTAL	5	6	11
TIES WITH MEDIAN	3	1	4

MEDIAN VALUE 4.000
CHI SQUARE 2.21 DF 1 P VALUE 0.1368
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	4	0	4
BELOW MEDIAN	2	5	7
TOTAL	6	5	11
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 3.000
CHI SQUARE 5.24 DF 1 P VALUE 0.0221
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	2	7
BELOW MEDIAN	1	4	5
TOTAL	6	6	12
TIES WITH MEDIAN	2	1	3

MEDIAN VALUE 2.000
CHI SQUARE 3.09 DF 1 P VALUE 0.0790
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	1	6
BELOW MEDIAN	1	6	7
TOTAL	6	7	13
TIES WITH MEDIAN	2	0	2

MEDIAN VALUE 3.000
CHI SQUARE 6.20 DF 1 P VALUE 0.0128
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	4	3	7
BELOW MEDIAN	2	3	5
TOTAL	6	6	12
TIES WITH MEDIAN	2	1	3

MEDIAN VALUE 3.000
CHI SQUARE 0.34 DF 1 P VALUE 0.5582
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 17 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	3	2	5
BELOW MEDIAN	2	3	5
TOTAL	5	5	10
TIES WITH MEDIAN	3	2	5

MEDIAN VALUE 3.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	1	6
BELOW MEDIAN	2	5	7
TOTAL	7	6	13
TIES WITH MEDIAN	1	1	2

MEDIAN VALUE 5.000
CHI SQUARE 3.90 DF 1 P VALUE 0.0483
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 27 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	3	1	4
BELOW MEDIAN	1	5	6
TOTAL	4	6	10
TIES WITH MEDIAN	3	1	4

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 14 MISSING CASES 1

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	0	5
BELOW MEDIAN	1	6	7
TOTAL	6	6	12
TIES WITH MEDIAN	2	1	3

MEDIAN VALUE 6.000
CHI SQUARE 8.57 DF 1 P VALUE 0.0034
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	0	5
BELOW MEDIAN	1	4	5
TOTAL	6	4	10
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 2.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	3	3	6
BELOW MEDIAN	5	2	7
TOTAL	8	5	13
TIES WITH MEDIAN	0	2	2

MEDIAN VALUE 3.000
CHI SQUARE 0.63 DF 1 P VALUE 0.4285
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	4	3	7
BELOW MEDIAN	2	4	6
TOTAL	6	7	13
TIES WITH MEDIAN	2	0	2

MEDIAN VALUE 2.000
CHI SQUARE 0.74 DF 1 P VALUE 0.3906
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	2	7
BELOW MEDIAN	2	3	5
TOTAL	7	5	12
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 2.000
CHI SQUARE 1.19 DF 1 P VALUE 0.2763
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 15 MISSING CASES 0

MEDIAN TEST FOR QUESTION 32 = GRP

	GRP		
	1	2	TOTAL
ABOVE MEDIAN	5	1	6
BELOW MEDIAN	0	2	2
TOTAL	5	3	8
TIES WITH MEDIAN	2	4	6

MEDIAN VALUE 2.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 14 MISSING CASES 1

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	7	2	9
BELOW MEDIAN	1	8	9
TOTAL	8	10	18
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 4.500
CHI SQUARE 8.10 DF 1 P VALUE 0.0044
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	5	8
BELOW MEDIAN	5	2	7
TOTAL	8	7	15
TIES WITH MEDIAN	0	3	3

MEDIAN VALUE 5.000
CHI SQUARE 1.73 DF 1 P VALUE 0.1888
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	4	5	9
BELOW MEDIAN	4	5	9
TOTAL	8	10	18
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 0.00 DF 1 P VALUE 1.0000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	4	7
BELOW MEDIAN	3	4	7
TOTAL	6	8	14
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 3.000

CHI SQUARE 0.00 DF 1 P VALUE 1.0000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	5	8
BELOW MEDIAN	4	3	7
TOTAL	7	8	15
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 5.000
CHI SQUARE 0.58 DF 1 P VALUE 0.4468
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	2	4	6
BELOW MEDIAN	4	4	8
TOTAL	6	8	14
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 5.000
CHI SQUARE 0.39 DF 1 P VALUE 0.5329
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 17 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	4	7
BELOW MEDIAN	5	3	8
TOTAL	8	7	15
TIES WITH MEDIAN	0	3	3

MEDIAN VALUE 5.000
CHI SQUARE 0.58 DF 1 P VALUE 0.4468
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	5	3	8
BELOW MEDIAN	3	5	8
TOTAL	8	8	16
TIES WITH MEDIAN	0	2	2

MEDIAN VALUE 6.000
CHI SQUARE 1.00 DF 1 P VALUE 0.3173
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION27 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	4	7
BELOW MEDIAN	1	4	5
TOTAL	4	8	12
TIES WITH MEDIAN	3	2	5

MEDIAN VALUE 4.000
CHI SQUARE 0.69 DF 1 P VALUE 0.4076
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 17 MISSING CASES 1

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	7	2	9
BELOW MEDIAN	1	8	9
TOTAL	8	10	18
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 4.500
CHI SQUARE 8.10 DF 1 P VALUE 0.0044
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	4	3	7
BELOW MEDIAN	3	5	8
TOTAL	7	8	15
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 3.000
CHI SQUARE 0.58 DF 1 P VALUE 0.4468
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	6	9
BELOW MEDIAN	5	4	9
TOTAL	8	10	18
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 0.90 DF 1 P VALUE 0.3428
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	4	5	9
BELOW MEDIAN	4	5	9
TOTAL	8	10	18
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 0.00 DF 1 P VALUE 1.0000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	4	7
BELOW MEDIAN	4	4	8
TOTAL	7	8	15
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 4.000
CHI SQUARE 0.08 DF 1 P VALUE 0.7821
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 18 MISSING CASES 0

MEDIAN TEST FOR QUESTION 32 = GRP

	GRP		
	1	3	TOTAL
ABOVE MEDIAN	3	5	8
BELOW MEDIAN	2	3	5
TOTAL	5	8	13
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 4.000
CHI SQUARE 0.01 DF 1 P VALUE 0.9282
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 17 MISSING CASES 1

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	7	6	13
BELOW MEDIAN	1	11	12
TOTAL	8	17	25
TIES WITH MEDIAN	0	4	4

MEDIAN VALUE 4.000
CHI SQUARE 5.44 DF 1 P VALUE 0.0148
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	3	7	10
BELOW MEDIAN	2	12	14
TOTAL	5	19	24
TIES WITH MEDIAN	3	2	5

MEDIAN VALUE 4.000
CHI SQUARE 0.87 DF 1 P VALUE 0.3500
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	4	10	14
BELOW MEDIAN	2	8	10
TOTAL	6	18	24
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 3.000
CHI SQUARE 0.23 DF 1 P VALUE 0.6326
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	3	10	13
BELOW MEDIAN	3	8	11
TOTAL	6	18	24
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 3.000
CHI SQUARE 0.06 DF 1 P VALUE 0.8130
MAX DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	5	7	12
BELOW MEDIAN	1	11	12
TOTAL	6	18	24
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 3.000
CHI SQUARE 3.56 DF 1 P VALUE 0.0593
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	4	9	13
BELOW MEDIAN	2	7	9
TOTAL	6	16	22
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 3.000
CHI SQUARE 0.20 DF 1 P VALUE 0.6581
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 27 MISSING CASES 2

MEDIAN TEST FOR QUESTION 17 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	3	9	12
BELOW MEDIAN	2	7	9
TOTAL	5	16	21
TIES WITH MEDIAN	3	5	8

MEDIAN VALUE 3.000
CHI SQUARE 0.02 DF 1 P VALUE 0.8824
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	6	7	13
BELOW MEDIAN	1	10	11
TOTAL	7	17	24
TIES WITH MEDIAN	1	4	5

MEDIAN VALUE 4.000
CHI SQUARE 3.96 DF 1 P VALUE 0.0465
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION27 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	6	7	13
BELOW MEDIAN	1	10	11
TOTAL	7	17	24
TIES WITH MEDIAN	0	4	4

MEDIAN VALUE 3.000
CHI SQUARE 3.96 DF 1 P VALUE 0.0465
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 28 MISSING CASES 1

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	7	6	13
BELOW MEDIAN	0	10	10
TOTAL	7	16	23
TIES WITH MEDIAN	1	5	6

MEDIAN VALUE 3.000
CHI SQUARE 7.74 DF 1 P VALUE 0.0054
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	3	8	11
BELOW MEDIAN	4	10	14
TOTAL	7	18	25
TIES WITH MEDIAN	1	3	4

MEDIAN VALUE 4.000
CHI SQUARE 0.01 DF 1 P VALUE 0.9428
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	3	9	12
BELOW MEDIAN	1	5	6
TOTAL	4	14	18
TIES WITH MEDIAN	4	7	11

MEDIAN VALUE 2.000
CHI SQUARE 0.16 DF 1 P VALUE 0.6885
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	2	7	9
BELOW MEDIAN	4	9	13
TOTAL	6	16	22
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 4.000
CHI SQUARE 0.20 DF 1 P VALUE 0.6581
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 27 MISSING CASES 2

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	4	7	11
BELOW MEDIAN	3	8	11
TOTAL	7	15	22
TIES WITH MEDIAN	1	6	7

MEDIAN VALUE 3.000
CHI SQUARE 0.21 DF 1 P VALUE 0.6471
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 0

MEDIAN TEST FOR QUESTION 32 = GRP

	GRP		
	1	4	TOTAL
ABOVE MEDIAN	5	8	13
BELOW MEDIAN	2	11	13
TOTAL	7	19	26
TIES WITH MEDIAN	0	2	2

MEDIAN VALUE 3.000
CHI SQUARE 1.76 DF 1 P VALUE 0.1847
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 28 MISSING CASES 1

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	5	10	15
BELOW MEDIAN	5	7	12
TOTAL	10	17	27
TIES WITH MEDIAN	0	4	4

MEDIAN VALUE 2.000
CHI SQUARE 0.20 DF 1 P VALUE 0.6559
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	8	7	15
BELOW MEDIAN	1	12	13
TOTAL	9	19	28
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 4.000
CHI SQUARE 6.65 DF 1 P VALUE 0.0099
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	5	10	15
BELOW MEDIAN	4	8	12
TOTAL	9	18	27
TIES WITH MEDIAN	1	3	4

MEDIAN VALUE 3.000
CHI SQUARE 0.00 DF 1 P VALUE 1.0000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	4	10	14
BELOW MEDIAN	4	8	12
TOTAL	8	18	26
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 3.000
CHI SQUARE 0.07 DF 1 P VALUE 0.7931
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	8	7	15
BELOW MEDIAN	1	11	12
TOTAL	9	18	27
TIES WITH MEDIAN	1	3	4

MEDIAN VALUE 3.000
CHI SQUARE 6.08 DF 1 P VALUE 0.0137
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	6	8	14
BELOW MEDIAN	3	10	13
TOTAL	9	18	27
TIES WITH MEDIAN	1	1	2

MEDIAN VALUE 4.000
CHI SQUARE 1.19 DF 1 P VALUE 0.2760
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 2

MEDIAN TEST FOR QUESTIONS17 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	7	8	15
BELOW MEDIAN	1	12	13
TOTAL	8	20	28
TIES WITH MEDIAN	2	1	3

MEDIAN VALUE 4.000
CHI SQUARE 5.18 DF 1 P VALUE 0.0228
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	6	7	13
BELOW MEDIAN	3	10	13
TOTAL	9	17	26
TIES WITH MEDIAN	1	4	5

MEDIAN VALUE 4.000
CHI SQUARE 1.53 DF 1 P VALUE 0.2162
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION27 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	6	7	13
BELOW MEDIAN	4	10	14
TOTAL	10	17	27
TIES WITH MEDIAN	0	4	4

MEDIAN VALUE 3.000
CHI SQUARE 0.89 DF 1 P VALUE 0.3445
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	6	6	12
BELOW MEDIAN	4	10	14
TOTAL	10	16	26
TIES WITH MEDIAN	0	5	5

MEDIAN VALUE 3.000
CHI SQUARE 1.25 DF 1 P VALUE 0.2629
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	3	11	14
BELOW MEDIAN	5	9	14
TOTAL	8	20	28
TIES WITH MEDIAN	2	1	3

MEDIAN VALUE 3.000
CHI SQUARE 0.70 DF 1 P VALUE 0.4028
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	6	8	14
BELOW MEDIAN	2	12	14
TOTAL	8	20	28
TIES WITH MEDIAN	2	1	3

MEDIAN VALUE 3.000
CHI SQUARE 2.80 DF 1 P VALUE 0.0943
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	5	7	12
BELOW MEDIAN	5	9	14
TOTAL	10	16	26
TIES WITH MEDIAN	0	3	3

MEDIAN VALUE 4.000
CHI SQUARE 0.10 DF 1 P VALUE 0.7558
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 29 MISSING CASES 2

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	6	7	13
BELOW MEDIAN	1	8	9
TOTAL	7	15	22
TIES WITH MEDIAN	3	6	9

MEDIAN VALUE 3.000
CHI SQUARE 3.01 DF 1 P VALUE 0.0827
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 31 MISSING CASES 0

MEDIAN TEST FOR QUESTION 32 = GRP

	GRP		
	3	4	TOTAL
ABOVE MEDIAN	7	8	15
BELOW MEDIAN	1	11	12
TOTAL	8	19	27
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 3.000
CHI SQUARE 4.70 DF 1 P VALUE 0.0302
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	2	3	5
BELOW MEDIAN	2	2	4
TOTAL	4	5	9
TIES WITH MEDIAN	0	2	2

MEDIAN VALUE 3.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 11 MISSING CASES 1

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	5	6
BELOW MEDIAN	4	2	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 3.09 DF 1 P VALUE 0.0790
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	3	4
BELOW MEDIAN	2	2	4
TOTAL	3	5	8
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	5	6
BELOW MEDIAN	4	2	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 3.09 DF 1 P VALUE 0.0790
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	5	6
BELOW MEDIAN	4	2	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 3.09 DF 1 P VALUE 0.0790
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	2	2	4
BELOW MEDIAN	2	3	5
TOTAL	4	5	9
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 17 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	2	4	6
BELOW MEDIAN	3	3	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 4.500
CHI SQUARE 0.34 DF 1 P VALUE 0.5582
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	2	3	5
BELOW MEDIAN	2	2	4
TOTAL	4	5	9
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 5.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION27 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	4	5
BELOW MEDIAN	4	1	5
TOTAL	5	5	10
TIES WITH MEDIAN	0	2	2

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	2	3	5
BELOW MEDIAN	3	2	5
TOTAL	5	5	10
TIES WITH MEDIAN	0	2	2

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	5	6
BELOW MEDIAN	4	2	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 2.500
CHI SQUARE 3.09 DF 1 P VALUE 0.0790
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	4	5
BELOW MEDIAN	3	2	5
TOTAL	4	6	10
TIES WITH MEDIAN	1	1	2

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	3	4
BELOW MEDIAN	3	2	5
TOTAL	4	5	9
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	4	5
BELOW MEDIAN	4	1	5
TOTAL	5	5	10
TIES WITH MEDIAN	0	2	2

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDI? I TEST FOR QUESTION 32 = GRP

	GRP		
	5	6	TOTAL
ABOVE MEDIAN	1	4	5
BELOW MEDIAN	2	1	3
TOTAL	3	5	8
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	2	2	4
BELOW MEDIAN	0	0	0
TOTAL	2	2	4
TIES WITH MEDIAN	2	5	7

MEDIAN VALUE 1.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 11 MISSING CASES 1

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	5	6
BELOW MEDIAN	4	2	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 3.09 DF 1 P VALUE 0.079C
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	3	4
BELOW MEDIAN	2	1	3
TOTAL	3	4	7
TIES WITH MEDIAN	2	3	5

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	2	4	6
BELOW MEDIAN	3	3	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 2.500
CHI SQUARE 0.34 DF 1 P VALUE 0.5582
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	4	5
BELOW MEDIAN	3	2	5
TOTAL	4	6	10
TIES WITH MEDIAN	1	1	2

MEDIAN VALUE 3.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	2	4	6
BELOW MEDIAN	3	3	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 4.500
CHI SQUARE 0.34 DF 1 P VALUE 0.5582
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 17 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	2	4	6
BELOW MEDIAN	3	3	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 5.500
CHI SQUARE 0.34 DF 1 P VALUE 0.5582
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	2	2	4
BELOW MEDIAN	2	2	4
TOTAL	4	4	8
TIES WITH MEDIAN	1	3	4

MEDIAN VALUE 5.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION27 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	5	6
BELOW MEDIAN	4	2	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 3.09 DF 1 P VALUE 0.0790
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	3	2	5
BELOW MEDIAN	0	4	4
TOTAL	3	6	9
TIES WITH MEDIAN	2	1	3

MEDIAN VALUE 2.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	4	5
BELOW MEDIAN	3	2	5
TOTAL	4	6	10
TIES WITH MEDIAN	1	1	2

MEDIAN VALUE 2.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	3	4
BELOW MEDIAN	3	2	5
TOTAL	4	5	9
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	4	5
BELOW MEDIAN	3	2	
TOTAL	4	6	10
TIES WITH MEDIAN	1	1	2

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	5	6
BELOW MEDIAN	4	2	6
TOTAL	5	7	12
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 3.09 DF 1 P VALUE 0.0790
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 12 MISSING CASES 0

MEDIAN TEST FOR QUESTION 32 = GRP

	GRP		
	5	7	TOTAL
ABOVE MEDIAN	1	3	4
BELOW MEDIAN	2	3	5
TOTAL	3	6	9
TIES WITH MEDIAN	2	0	2

MEDIAN VALUE 4.000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 11 MISSING CASES 1

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	2	7	9
BELOW MEDIAN	2	6	8
TOTAL	4	13	17
TIES WITH MEDIAN	0	3	3

MEDIAN VALUE 3.000
CHI SQUARE 0.02 DF 1 P VALUE 0.8928
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 20 MISSING CASES 1

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	8	9
BELOW MEDIAN	4	5	9
TOTAL	5	13	18
TIES WITH MEDIAN	0	3	3

MEDIAN VALUE 4.000
CHI SQUARE 2.49 DF 1 P VALUE 0.1144
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	8	9
BELOW MEDIAN	2	2	4
TOTAL	3	10	13
TIES WITH MEDIAN	2	6	8

MEDIAN VALUE 4.000
CHI SQUARE 2.36 DF 1 P VALUE 0.1245
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	7	8
BELOW MEDIAN	4	5	9
TOTAL	5	12	17
TIES WITH MEDIAN	0	4	4

MEDIAN VALUE 4.000
CHI SQUARE 2.08 DF 1 P VALUE 0.1491
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	0	9	9
BELOW MEDIAN	4	4	8
TOTAL	4	13	17
TIES WITH MEDIAN	1	3	4

MEDIAN VALUE 4.000
CHI SQUARE 5.88 DF 1 P VALUE 0.0153
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	2	5	7
BELOW MEDIAN	3	6	9
TOTAL	5	11	16
TIES WITH MEDIAN	0	5	5

MEDIAN VALUE 5.000
CHI SQUARE 0.04 DF 1 P VALUE 0.8385
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN T ST FOR QUESTION 17 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	2	4	6
BELOW MEDIAN	3	6	9
TOTAL	5	10	15
TIES WITH MEDIAN	0	6	6

MEDIAN VALUE 5.000
CHI SQUARE 0.00 DF 1 P VALUE 1.0000
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	2	5	7
BELOW MEDIAN	2	8	10
TOTAL	4	13	17
TIES WITH MEDIAN	1	3	4

MEDIAN VALUE 5.000
CHI SQUARE 0.17 DF 1 P VALUE 0.6818
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION27 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	8	9
BELOW MEDIAN	2	1	3
TOTAL	3	9	12
TIES WITH MEDIAN	2	7	9

MEDIAN VALUE 3.000
CHI SQUARE 3.70 DF 1 P VALUE 0.0543
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	2	6	8
BELOW MEDIAN	3	7	10
TOTAL	5	13	18
TIES WITH MEDIAN	0	3	3

MEDIAN VALUE 4.000
CHI SQUARE 0.06 DF 1 P VALUE 0.8139
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	6	7
BELOW MEDIAN	4	5	9
TOTAL	5	11	16
TIES WITH MEDIAN	0	5	5

MEDIAN VALUE 4.000
CHI SQUARE 1.67 DF 1 P VALUE 0.1967
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	8	9
BELOW MEDIAN	3	6	9
TOTAL	4	14	18
TIES WITH MEDIAN	1	2	3

MEDIAN VALUE 4.000
CHI SQUARE 1.29 DF 1 P VALUE 0.2568
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	6	7
BELOW MEDIAN	3	6	9
TOTAL	4	12	16
TIES WITH MEDIAN	1	4	5

MEDIAN VALUE 4.000
CHI SQUARE 0.76 DF 1 P VALUE 0.3827
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	1	7	8
BELOW MEDIAN	4	5	9
TOTAL	5	12	17
TIES WITH MEDIAN	0	4	4

MEDIAN VALUE 4.000
CHI SQUARE 2.08 DF 1 P VALUE 0.1491
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 32 = GRP

	GRP		
	5	8	TOTAL
ABOVE MEDIAN	0	7	7
BELOW MEDIAN	4	6	10
TOTAL	4	13	17
TIES WITH MEDIAN	1	3	4

MEDIAN VALUE 5.000
CHI SQUARE 3.66 DF 1 P VALUE 0.0557
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 21 MISSING CASES 0

MEDIAN TEST FOR QUESTION 11 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	11	6	17
BELOW MEDIAN	11	11	22
TOTAL	22	17	39
TIES WITH MEDIAN	3	4	7

MEDIAN VALUE 3.000
CHI SQUARE 0.84 DF 1 P VALUE 0.3584
MAX. DIFF. ALLOWED BTWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 14 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	12	7	19
BELOW MEDIAN	8	12	20
TOTAL	20	19	39
TIES WITH MEDIAN	5	2	7

MEDIAN VALUE 4.000
CHI SQUARE 2.09 DF 1 P VALUE 0.1481
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 19 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	9	10	19
BELOW MEDIAN	11	8	19
TOTAL	20	18	38
TIES WITH MEDIAN	5	3	8

MEDIAN VALUE 3.000
CHI SQUARE 0.42 DF 1 P VALUE 0.5158
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 22 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	8	10	18
BELOW MEDIAN	12	8	20
TOTAL	20	18	38
TIES WITH MEDIAN	5	3	8

MEDIAN VALUE 3.000
CHI SQUARE 0.92 DF 1 P VALUE 0.3376
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 26 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	14	7	21
BELOW MEDIAN	8	11	19
TOTAL	22	18	40
TIES WITH MEDIAN	3	3	6

MEDIAN VALUE 3.000
CHI SQUARE 2.43 DF 1 P VALUE 0.1189
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 13 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	11	8	19
BELOW MEDIAN	11	10	21
TOTAL	22	18	40
TIES WITH MEDIAN	3	1	4

MEDIAN VALUE 4.000
CHI SQUARE 0.12 DF 1 P VALUE 0.7263
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 44 MISSING CASES 2

MEDIAN TEST FOR QUESTION 17 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	14	9	23
BELOW MEDIAN	11	12	23
TOTAL	25	21	46
TIES WITH MEDIAN	0	0	0

MEDIAN VALUE 3.500
CHI SQUARE 0.79 DF 1 P VALUE 0.3745
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 24 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	14	7	21
BELOW MEDIAN	9	10	19
TOTAL	23	17	40
TIES WITH MEDIAN	2	4	6

MEDIAN VALUE 4.000
CHI SQUARE 1.52 DF 1 P VALUE 0.2176
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION27 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	14	7	21
BELOW MEDIAN	10	10	20
TOTAL	24	17	41
TIES WITH MEDIAN	0	4	4

MEDIAN VALUE 3.000
CHI SQUARE 1.17 DF 1 P VALUE 0.2789
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 45 MISSING CASES 1

MEDIAN TEST FOR QUESTION 31 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	14	6	20
BELOW MEDIAN	9	10	19
TOTAL	23	16	39
TIES WITH MEDIAN	2	5	7

MEDIAN VALUE 3.000
CHI SQUARE 2.06 DF 1 P VALUE 0.1509
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 10 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	10	12	22
BELOW MEDIAN	8	3	11
TOTAL	18	15	33
TIES WITH MEDIAN	7	6	13

MEDIAN VALUE 2.000
CHI SQUARE 2.20 DF 1 P VALUE 0.1380
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 12 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	12	8	20
BELOW MEDIAN	9	12	21
TOTAL	21	20	41
TIES WITH MEDIAN	4	1	5

MEDIAN VALUE 3.000
CHI SQUARE 1.20 DF 1 P VALUE 0.2723
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 20 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	11	10	21
BELOW MEDIAN	9	8	17
TOTAL	20	18	38
TIES WITH MEDIAN	5	1	6

MEDIAN VALUE 3.000
CHI SQUARE 0.00 DF 1 P VALUE 0.9726
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 44 MISSING CASES 2

MEDIAN TEST FOR QUESTION 30 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	11	7	18
BELOW MEDIAN	9	8	17
TOTAL	20	15	35
TIES WITH MEDIAN	5	6	11

MEDIAN VALUE 3.000
CHI SQUARE 0.24 DF 1 P VALUE 0.6254
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 46 MISSING CASES 0

MEDIAN TEST FOR QUESTION 32 = GRP

	GRP		
	9	4	TOTAL
ABOVE MEDIAN	13	8	21
BELOW MEDIAN	9	11	20
TOTAL	22	19	41
TIES WITH MEDIAN	2	2	4

MEDIAN VALUE 3.000
CHI SQUARE 1.18 DF 1 P VALUE 0.2779
MAX. DIFF. ALLOWED BETWEEN A TIE 1.0E-0005
CASES INCLUDED 45 MISSING CASES 1

Appendix E. Results of Friedman's Test for Skill and Knowledge Areas Ranking Schemes & Multiple Pairwise Testing Procedure.

Ranking of Skills

STATISTIX 3.1

Legend:

Skil1 = Technical Skills
Skil2 = Communication Skills
Skil3 = Decision Making Skills
Skil4 = Operational Skills (experience in the use and maintenance of weapon systems/components)
Skil5 = Administrative Skills
Skil6 = Leadership Skills

BEST Officers

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
SKIL1	3.17	6
SKIL2	3.00	6
SKIL3	2.67	6
SKIL4	2.83	6
SKIL5	5.83	6
SKIL6	3.50	6

FRIEDMAN STATISTIC 11.90
P VALUE, CHI-SQUARED APPROXIMATION 0.0361
DEGREES OF FREEDOM 5
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 36 MISSING CASES 0

Coefficient of Concordance W = Friedman Statistic/k(N-1)

where k = sample size
N = number of ranked items

W = 11.9/6(6-1) = .397

Multiple Pairwise Testing Procedure (23:950)

"Testing the limits for all g = N(N-1)/2 pairwise comparisons using the mean ranks" Rbarj "are set up as follows for family level of significance α:"

Rbarj - Rbarj' = +/- B SQR[N(N-1)/6k]

B = z(1-α/2g)

g = N(N-1)/2

N = number of ranked items
k = sample size

Other Non-rated Officers

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
SKIL1	3.14	7
SKIL2	3.14	7
SKIL3	3.00	7
SKIL4	3.14	7
SKIL5	5.71	7
SKIL6	2.86	7

FRIEDMAN STATISTIC 11.90
P VALUE, CHI-SQUARED APPROXIMATION 0.0362
DEGREES OF FREEDOM
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 42 MISSING CASES 0

W = 11.9/7(6-1) = .34

Multiple Pairwise Tesing Procedure

g = 15
B(α=.1) = 2.72
C = 1
Rbarj - Rbarj'= +/- B*C = +/- 2.72

Significant Differences between the following pairs:

Skil5 & Skil6

Rated Officers

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
SKIL1	4.33	9
SKIL2	1.78	9
SKIL3	2.89	9
SKIL4	4.00	9
SKIL5	5.11	9
SKIL6	2.89	9

FRIEDMAN STATISTIC 18.65
P VALUE, CHI-SQUARED APPROXIMATION 0.0022
DEGREES OF FREEDOM 5
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 54 MISSING CASES 0

W = 18.65/9(6-1) = .414

Multiple Pairwise Tesing Procedure

q = 15
B(α=.1) = 2.72
C = .8819
Rbarj - Rbarj' = +/- B*C = +/- 2.399

Significant Differences between the following pairs:

Skil5 & Skil2, Skil1 & Skil2

Officers with No-ops

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
SKIL1	2.50	20
SKIL2	2.20	20
SKIL3	2.95	20
SKIL4	4.00	20
SKIL5	5.55	20
SKIL6	3.80	20

FRIEDMAN STATISTIC 43.06
P VALUE, CHI-SQUARED APPROXIMATION 0.0000

DEGREES OF FREEDOM 5
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 120 MISSING CASES 0

W = 43.06/20(6-1) = .43

Multiple Pairwise Tesing Procedure

g = 15
B(α=.1) = 2.72
C = .592
Rbarj - Rbarj' = +/- B*C = +/- 1.61

Significant Differences between the following pairs:

Skil5 & Skil2, Skil1 & Skil2

Ranking of Knowledge Areas

Legend:

Know1 = Knowldege of the technology required to make the weapon system work.
Know2 = Knowledge of the maintenance required to keep the weapon system working.
Know3 = Knowldege of Federal Acquisition Regulations (FARs) and the Air Force regulations relevant to the acquisition of weapon system.
Know4 = Knowledeg of threat affecting the capability of the weapon the weapon system.
Know5 = Knowledge of the acquisition process.
Know6 = Knowldege of the tactics of deployment of the weapon system.

BEST Officers

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
KNOW1	2.00	6
KNOW2	3.00	6
KNOW3	6.00	6
KNOW4	3.33	6
KNOW5	4.00	6
KNOW6	2.67	6

FRIEDMAN STATISTIC 16.67
P VALUE, CHI-SQUARED APPROXIMATION 0.0052
DEGREES OF FREEDOM 5
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 36 MISSING CASES 0

W = 16.67/6(6-1) = .556

Multiple Pairwise Tesing Procedure

q = 15
B(α=.1) = 2.72
C = 1.08
Rbarj - Rbarj' = +/- B*C = +/- 2.94

Significant Differences between the following pairs:

Know3 & Know1, Know3 & Know6, Know3 & know2

Other Non-rated Officers

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
KNOW1	2.43	7
KNOW2	3.29	7
KNOW3	4.71	7
KNOW4	3.29	7
KNOW5	3.29	7
KNOW6	4.00	7

FRIEDMAN STATISTIC 6.020
P VALUE, CHI-SQUARED APPROXIMATION 0.3042
DEGREES OF FREEDOM 5
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 42 MISSING CASES 0

W = 6.02/7(6-1) = .172

Multiple Pairwise Tesing Procedure

q = 15
B(α=.1) = 2.72
C = 1.0
Rbarj - Rbarj' = +/- B*C = +/- 2.72

No significance found between any pairs.

Rated Officers

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
KNOW1	3.56	9
KNOW2	4.00	9
KNOW3	4.78	9
KNOW4	2.67	9
KNOW5	3.33	9
KNOW6	2.67	9

FRIEDMAN STATISTIC 8.492
P VALUE, CHI-SQUARED APPROXIMATION 0.1311
DEGREES OF FREEDOM 5
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 54 MISSING CASES 0

W = 8.492/9(6-1) = .189

Multiple Pairwise Tesing Procedure

q = 15
B(α=.1) = 2.72
C = .88
Rbarj - Rbarj' = +/- B*C = +/- 2.4

No significance found between any pairs.

Officers with No-ops

FRIEDMAN TWO WAY NONPARAMETRIC AOV

FACTOR 1 VARIABLE	MEAN RANK	SAMPLE SIZE
KNOW1	2.11	19
KNOW2	3.21	19
KNOW3	5.47	19
KNOW4	3.37	19
KNOW5	4.16	19
KNOW6	2.68	19

FRIEDMAN STATISTIC 38.22
P VALUE, CHI-SQUARED APPROXIMATION 0.0000
DEGREES OF FREEDOM 5
MAX. DIFF. ALLOWED BETWEEN TIES 1.0E-0005
CASES INCLUDED 114 MISSING CASES 0

W = 38.22/19(6-1) = .402

Multiple Pairwise Tesing Procedure

q = 15
B(α=.1) = 2.72
C = .6069
Rbarj - Rbarj' = +/- B*C = +/- 1.65

Significant Differences between the following pairs:

Know3 & Know1, Know3 & Know6, Know3 & Know2, Know3 & Know4
Know5 & Know1

Bibliography

1. Lohmeyer, Maj Dan. "Acquisition Manager Career Development Initiatives," Program Manager, 15: 21-23 (July-August 1986).

2. Headquarters Air Force Systems Command. Officer Personnel: Acquisition Management Professional Development. AFSCR 36-5. Andrews AFB DC: HQ AFSC, 9 September 1988.

3. Department of the Air Force. Officer Professional Development. AFR 36-23. Washington: HQ USAF, 1 January 1989.

4. Jones, James W. "The Making of an Acquisition Officer," Government Executive, 19: 22-30 (November/ December 1987).

5. Fox, J. Ronald. The Defense Management Challenge: Weapons Acquisition. Boston: Harvard Business School Press, 1988.

6. Bower, Maj Steven M., Chief of Acquisition, Scientific and Contracting Assignments. Telephone Interview. HQ AFSC/DPROA-2, Andrews AFB MD. 26 March 1991.

7. Ballengee, Maj Joseph K., Deputy Director, Chemical Defense Systems Division. Telephone Interview. HSD/YAZ, Brooks AFB TX. 17 April 1991.

8. Department of the Air Force. Officer Air Force Specialty. AFR 36-1. Washington: HQ USAF, 1 January 1989.

9. Department of the Air Force. Officer Personnel: Acquisition Professional Development. AFR 36-27. Washington: HQ USAF, 26 December 1990.

10. Lopez, Capt Kevin W. Impact of AFSC Regulation 36-5 on the 27XX Career Field. MS Thesis, AFIT/GSM/LSY/87S-17. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1987 (AD-A186913).

11. McConnel, Capt Reed J. Impact of Air Force Systems Command Regulation 36-5 on the 27XX Career Field. MS Thesis, AFIT/GSM/LSY/88S-18. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1988 (AD-A201516).

12. Randolph, Gen Bernard P. "Air Force Acquisition: Toward the Direct Route," Program Manager, XVII: 2-8 (September-October 1988).

13. Denney, Jeffrey. "Better Buyers, Better Weapons," Military Logistics Forum, I: 16-25 (May 1985).

14. Lilly, Maj Lee. "A Special Breed of Cat," Air University Review, 26: 85-88 (September/October 1975).

15. Linsley, Clyde. "Buying in a Fishbowl: Two Acquisition Officers," Government Executive, 19: 24 (November/December 1987).

16. Fox, J. Ronald. Arming America. Boston: Harvard University Press, 1974.

17. Kerzner, Harold. Project Management: A Systems Approach to Planning, Scheduling and Controlling. New York: Van Nostrand Reinhols Company Inc., 1984.

18. Von Hippel, Eric. "New Product Ideas From 'Lead Users'," IEEE Engineering Management Review, 18: 60-63 (May-Jun 1989).

19. Emory, C. William. Business Research Methods (Third Edition). Homewood IL: Irwin, 1985.

20. Fowler, Floyd J., Jr. Survey Research Methods. Beverly Hills: Sage Publications,Inc., 1984.

21. O'Muircheartaigh, Colm A. and Clive Payne. The Analysis of Survey Data: Volume I, Exploring Data Structures. London: John Wiley & Sons, 1977.

22. Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Company, 1956.

23. Neter, John and others. Applied Linear Statistical Models (Third Edition). Homewood IL: Irwin, 1990.

VITA

Captain Andrew A. Abraham was born on 26 November 1962 in Misawa AFB, Japan. He graduated from Rio Piedras Heights High School, Puerto Rico in 1980. He studied at the Stevens Institute of Technology in Hoboken, New Jersey, graduating in 1985 with a Bachelor of Engineering, concentrated on Electrical Engineering.

Upon graduation, he was commissioned as a Second Lieutenant through the Air Force Reserve Officer Training Corps. Captain Abraham was then assigned to the Electronic Combat and Reconnaissance SPO, Aeronautical Systems Division for three years and was then subsequently assigned to the Air Force Electronic Combat Office for one and a half years, where he worked as Program Manager in the development of digital electronic combat simulations. In 1990, Captain Abraham entered the Air Force Institute of Technology, School of Systems and Logistics, as a graduate student in Systems Management. He is married to the lovely Helene A. Maliko-Abraham.

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REPORT DOCUMENTATION PAGE

September 1991 | Master's Thesis

AN ANALYSIS OF THE BENEFITS OF OPERATIONAL EXPERIENCE ACQUIRED BY AIR FORCE SYSTEMS COMMAND (AFSC) OFFICERS THROUGH THE BROADENING EXPERIENCE TOUR (BEST) PROGRAM

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Approved for public release; distribution unlimited

This research effort was conducted to study the effects that operational experience acquired through the Broadening Experience Tour (BEST) program has on the ability of scientific and development engineering (S&DE) officers to develop useful operator-oriented systems. A review of the related literature revealed that although the Air Force encourages S&DE officers to acquire operational experience, there is no empirical evidence of the reported benefits of this experience. A cross sectional study was undertaken to measure the difference in self reported competency between samples of S&DE officers with and without operational experience. A survey was designed to measure the ability of the S&DE officers to interpret operational requirements, to communicate with the using organizations, and to measure the credibility of their personal judgement. The results of the study revealed that operational experience acquired through the BEST program enhanced the ability of S&DE officers to communicate with the using organizations. Rated officers ranked themselves higher than BEST officers in their ability to interpret operational requirements. No difference was found in the level of credibility between officers with and without operational experience.

Air Force Procurement, Air Force Personnel, Personnel Development, Acquisition, Systems Management, Training

Unclassified | Unclassified | Unclassified

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